

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference X Sch/mv/9R	FOR FURTHER ACTION		See Notification of Transmittal of International Preliminary Examination Report (PCT/IPEA/416)
International application No. PCT/NL96/00209	International filing date (day/month/year) 24/05/1996	Priority date (day/month/year) 24/05/1995	
International Patent Classification (IPC) or national classification and IPC A63C1/28			
Applicant GIERVELD BEHEER B.V. et al.			

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.



2. This REPORT consists of a total of 6 sheets, including this cover sheet.

- ☐ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☒ Certain defects in the international application
- VIII ☒ Certain observations on the international application

Date of submission of the demand 02/12/1996	Date of completion of this report 19.08.97
Name and mailing address of the IPEA/  European Patent Office D-80298 Munich Tel. (+49-89) 2399-0, Tx: 523656 epmu d Fax: (+49-89) 2399-4465	Authorized officer Poock, M Telephone No. (+49-89) 2399-2461 

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/NL96/00209

I. Basis of the report

1. This report has been drawn on the basis of (*substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments.*):

Description, pages:

1-11 as originally filed

Claims, No.:

1-13 as originally filed

Drawings, sheets:

1/17-17/17 as originally filed

2. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
☐ the claims, Nos.:
☐ the drawings, sheets:

3. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

4. Additional observations, if necessary:

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/NL96/00209

II. Priority

1. ☐ This report has been established as if no priority had been claimed due to the failure to furnish within the prescribed time limit the requested:
- ☐ copy of the earlier application whose priority has been claimed.
 - ☐ translation of the earlier application whose priority has been claimed.
2. ☐ This report has been established as if no priority had been claimed due to the fact that the priority claim has been found invalid.

Thus for the purposes of this report, the international filing date indicated above is considered to be the relevant date.

3. Additional observations, if necessary:

III. Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non-obvious), or to be industrially applicable have not been examined in respect of:

- ☐ the entire international application.
- ☐ claims Nos. .

because:

- ☐ the said international application, or the said claims Nos. relate to the following subject matter which does not require an international preliminary examination (*specify*):
- ☐ the description, claims or drawings (*indicate particular elements below*) or said claims Nos. are so unclear that no meaningful opinion could be formed (*specify*):
- ☐ the claims, or said claims Nos. are so inadequately supported by the description that no meaningful opinion could be formed.
- ☐ no international search report has been established for the said claims Nos. .

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/NL96/00209

IV. Lack of unity of invention

1. In response to the invitation to restrict or pay additional fees the applicant has:

- ☐ restricted the claims..
- ☐ paid additional fees.
- ☐ paid additional fees under protest.
- ☐ neither restricted nor paid additional fees.

2. This Authority found that the requirement of unity of invention is not complied and chose, according to Rule 68.1, not to invite the applicant to restrict or pay additional fees.

3. This Authority considers that the requirement of unity of invention in accordance with Rules 13.1, 13.2 and 13.3 is

- ☐ complied with.
- ☐ not complied with for the following reasons:

4. Consequently, the following parts of the international application were the subject of international preliminary examination in establishing this report:

- ☐ all parts.
- ☐ the parts relating to claims Nos. .

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-13
	No:	Claims	
Inventive step (IS)	Yes:	Claims	1-13
	No:	Claims	
Industrial applicability (IA)	Yes:	Claims	1-13
	No:	Claims	

2. Citations and explanations

cf Separate Sheet, point 1

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/NL96/00209

VI. Certain documents cited

1. Certain published documents (Rule 70.10)

2. Non-written disclosures (Rule 70.9)

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

cf. Separate Sheet, points 2, 4

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

cf. Separate Sheet, point 3

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/NL96/00209

1. The closest state of the art is disclosed in EP-A-0 192 312.

The objective problem to be solved by the subject matter of Claim 1 may therefore be regarded as to provide an improved frame for a sporting device for coupling to a shoe.

The solution to such problem is achieved according to the characterising portion of Claim 1 in that the sub-frames are pivotable **and** translatable in the main plane. According to EP-A-0 192 312 and all other documents in the proceedings, the sub-frames are only pivotable so that it required an inventive effort to find the subject-matter of Claim 1.

Claims 2-13 are dependent from Claim 1 and define preferred embodiments. They meet the requirements of Article 33(1) PCT.

2. The features of the claims are not provided with reference signs placed in parentheses (Rule 6.2(b) PCT).
3. The application does not meet the requirements of Rule 6.2b PCT because "optionally theoretical" and "real or virtual" used in the claims in brackets are no reference signs.

According to Rule 6.2a PCT claims can rely on the drawings **only where absolutely necessary**. In the case of claim 9 it is not necessary (cf. PCT Preliminary Examination Guidelines III, 4.10).

4. Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the document EP-A-0 192 312 is not mentioned in the description, nor is this document identified therein.

A document reflecting the prior art described on page 1, is not identified in the description (Rule 5.1(a)(ii) PCT).

77 Rec'd PCT/087 25NOV1997

PATENT APPLICATION/PCT

087 952775

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

IN RE APPLICATION OF:

ATTORNEY'S DOCKET NUMBER

JOHAN GIERVELD,
DIEDERIK HENDRIK ALEWIJN HOL
and EGBERT OTTEN

702-971578

PCT/NL96/00209

ENTITLED

"SPORT DEVICE"

To BOX PCT
Attention: DO/EO/US

Assistant Commissioner for Patents
Washington, D.C. 20231

EXPRESS MAIL CERTIFICATE

"Express Mail" Label Number EM081684016US

Date of Deposit November 21, 1997

I hereby certify that the following attached paper or fee

WRITTEN OPINION (PCT/IPEA/408) mailed 06.03.97

is being deposited with the United States Postal Service
"Express Mail Post Office to Addressee" service under 37
C.F.R. §1.10 on the date indicated above and is addressed to
the Assistant Commissioner for Patents, Washington, D.C.
20231.

Nora Ann Pastrick

(Typed name of person mailing paper or fee)

Nora Ann Pastrick

(Signature of person mailing paper or fee)

INTERNATIONAL COOPERATION TREATY

From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

PCT

To:

SCHUMANN, B. H. J.
ARNOLD & SIEDSMA
Sweelinckplein 1
NL-2517 GK The Hague
PAYS-BAS

X-9R	
10 MAART 1997	

WRITTEN OPINION

(PCT Rule 66)

Date of mailing
(day/month/year)

06.03.97

Applicant's or agent's file reference

X Sch/mv/9R

REPLY DUE

within 3 months/days
from the above date of mailing

International application No.

PCT/NL 96/00209

International filing date (day/month/year)

24/05/1996

Priority date (day/month/year)

24/05/1995

International Patent Classification (IPC) or both national classification and IPC

A63C1/28

Applicant

GIERVELD BEHEER B.V. et al.

1. This written opinion is the first (first, etc.) drawn up by this International Preliminary Examining Authority.

2. This report contains indications and corresponding pages relating to the following items:

- I ☒ Basis of the opinion
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability, citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☒ Certain observations on the international application

OKT 080	
OKT 070	
OKT TAX	
AGENDA: 06-06-97 Verstakt	

3. The applicant is hereby invited to reply to this opinion.

When? See the time limit indicated above. The applicant may, before the expiration of that time limit, request this Authority to grant an extension, see Rule 66.2(d).

How? By submitting a written reply, accompanied, where appropriate, by amendments, according to Rule 66.3. For the form and the language of the amendments, see Rules 66.8 and 66.9.

Also For an additional opportunity to submit amendments, see Rule 66.4.
For the examiner's obligation to consider amendments and/or arguments, see Rule 66.4bis.
For an informal communication with the examiner, see Rule 66.6.

If no reply is filed, the international preliminary examination report will be established on the basis of this opinion.

4. The final date by which the international preliminary examination report must be established according to Rule 69.2 is: 24/09/1997

Name and mailing address of the IPEA/



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Authorized officer

Examiner

M. Pocock

Formalities officer

(incl. extension of time limits)

Telephone No.

2198-1453 Maria Brand

WRITTEN OPINION

Intern. application No.

PCT/NL96/00209

I. Basis of the opinion

1. This opinion has been drawn up on the basis of (Substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this opinion as "originally filed".):

☒ the international application as originally filed.

☐ the description, pages _____, as originally filed,
pages _____, filed with the demand,
pages _____, filed with the letter of _____,

☐ the claims, Nos. _____, as originally filed,
Nos. _____, as amended under Article 19,
Nos. _____, filed with the demand,
Nos. _____, filed with the letter of _____,

☐ the drawings, sheets/fig _____, as originally filed,
sheets/fig _____, filed with the demand,
sheets/fig _____, filed with the letter of _____,

2. The amendments have resulted in the cancellation of:

☐ the description, pages _____.
☐ the claims, Nos. _____.
☐ the drawings, sheets/fig _____.

3. ☐ This opinion has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

4. Additional observations, if necessary:

WRITTEN OPINION

Intern. application No.

PCT/NL96/00209

V. Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement

1. STATEMENT

Novelty (N)	Claims 1 _____
	Claims _____
Inventive Step (IS)	Claims _____
	Claims _____
Industrial Applicability (IA)	Claims _____
	Claims _____

2. CITATIONS AND EXPLANATIONS

- a. The following document is mentioned for the first time in this written opinion; the numbering will be adhered to in the rest of the procedure:

D1: EP-A-0 192 312.

- b. The present application does not satisfy the criterion set forth in Article 33(2) PCT because the subject-matter of claim 1 is not new in respect of prior art as defined in the regulations (Rule 64(1)-(3) PCT).

- b1. D1 discloses, for example in Fig. 5, all features of this claim, particularly an upper sub-frame 19, a lower sub-frame 17, a pivot mechanism 16 which is also a re-setting spring means (column 3, lines 23-30). When the upper sub-frame 19 is pivoted around axis 21 the frames 19 and 17 are mutually translated and pivoted.

- b2. The subject-matter of claim 1 was therefore already known in the state of the art.
-

-
- c. The additional features of dependent claim 2 are not disclosed in their present form in any of the documents cited in the search report.

If the applicant is of the opinion that by incorporating these features into claim 1 a claim would ensue which would satisfy the criteria set forth in Article 33(1) PCT, a new independent claim should be drafted to include these features, bearing in mind that the features known in combination in D1 should be placed in the preamble of such a claim in accordance with Rule 6.3(b) PCT.

The applicant should also indicate in his letter of reply the inventive significance thereof.

Reference signs in parentheses should be inserted in the claims to increase their intelligibility, Rule 6.2(b) PCT. This applies to both the preamble and characterising portion.

- d. To meet the requirements of Rule 5.1(a)(ii) PCT, the document D1 could be identified in the description and the relevant background art disclosed therein could be briefly discussed.

If the applicant is aware of a document reflecting the prior art which is described on page 1, then the document could be identified in the description, Rule 5.1(a)(ii) PCT.

The description could be made consistent with the new claims to be filed.

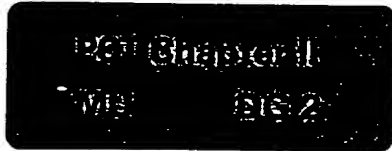
- e. The attention of the applicant is drawn to the fact that the application may not be amended in such a way that it
-

contains subject-matter which extends beyond the content of the application as filed, Article 34(2)(b) PCT. If other than the discussed amendments will be made, the applicant is requested, in order to expedite the further examination, to indicate with the reply the location/s/ in the application as originally filed of the passage/s/ forming a basis for the amendment/s/.

ARNOLD SIEDSMA

ATTORNEYS AT LAW PATENT ATTORNEYS

The International Bureau of WIPO
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Trademarks, Designs
Mr P.P.J.M. Verhaag
Ms L.J. Kraemer

P.O. Box 18558, NL-2502 EN THE HAGUE, June 6, 1997

Our ref.: X Sch/BM/9r-pct
Your ref.: --

Re: international patent application
no. PCT/NL96/00209
Name: Gierveld Beheer B.V.

I refer to your first Written Opinion of 06.03.97.

This invention is relative to a frame for a sporting device, such as a skate. The device comprises an upper sub-frame to be coupled with a shoe and a lower sub-frame which is coupled via a pivot mechanism to said upper sub-frame. The lower sub-frame is or can be provided with a runner or wheels. The both sub-frames are urged toward each other by means of resetting spring means.

In the preamble to the description of the present application, page 1, lines 14-21 the prior art, consisting of the tumble skate, is acknowledged. According to this acknowledgement the prior art tumble skate is designed in a way such that the both sub-frames are not only mutually pivotable or rotatable but rather also translatable in the main plane determined by the mutual pivotability.

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The Hague, June 6, 1997

2.

Though by the time of drafting of the present patent application applicants were not aware of EP-A-0 192 312, the description of the prior art in the present patent application exactly and for a full 100 % reads on the skate structure according to the said European prior art specification.

Please note that according to the given description and the whole prior art specification the two sub-frames are only movable with one single degree of freedom, viz. a rotation degree of freedom. Since one as only one pivot axis is defined by the stationary or fixed pivot or hinge structure clearly shown in e.g. figures 5 and 6 of the prior art reference. The entire prior art reference is directed to one single transverse axis around which the pivot action of the two sub-frames is defined. There is not even a remote suggestion relative to the possibility of combining this one single rotation degree of freedom with a dependent or coupled degree of freedom of translation which is exactly the novel feature according to present independent claim 1 of the present patent application. As an explanation I beg to refer to the figures 1 and 2 of the present patent application and specifically figures 2A, 2B and 2C. These figures are in the present patent application specifically acknowledged as prior art, at least as a potential variant of the prior art known to applicants by the time of the invention, but acknowledged in a way such that it is made unambiguously clear that the single degree of freedom according to this prior art is not forming part of the invention as claimed.

It should be appreciated that a rotation degree of freedom without a degree of freedom of translation is defined on basis of a structure in which only a rotation around one single fixed rotation axis is possible.

The Hague, June 6, 1997

3.

The combination of the two degrees of freedom as required by the characterizing portion of independent claim 1 as filed effectively requires that the pivot axis is not stationary but rather is also subjected to a displacement. In order to satisfy the mechanical stability criteria given by the laws of mechanical engineering the two degrees of freedom effectively have to be unambiguously related with each other but it is absolutely vital that both a rotation and a translation be possible.

E.g. figure 7A of the present application shows a very simple example of two sub-frames which are both pivotable and translatable to each other. During rotation of the upper sub-frame relative to the stationary lower sub-frame there is no point of the upper sub-frame that does not undergo a translation relative to the lower sub-frame. Therefor no single rotation axis can be defined.

Figure 7B shows a further elaboration having basically the same mechanical properties as figure 7A. Please note that in the rest position of the upper sub-frame, indicated with 3, the shoe 3 has a certain position indicated with solid lines; in the extreme upper position indicated with 3' the upper sub-frame is not only rotated but also has undergone a translation relative to the lower sub-frame 5 as can be clearly seen by the shoe 2' in this situation drawn in dotted lines. The pivot axis clearly is not stationary but moves from 3 to 3' in forward direction.

Both figures 7A and 7B show structures in which the translation and rotation degrees of freedom are unambiguously coupled with each other.

The Hague, June 6, 1997

4.

The center of rotation thus follows a path which in figure 7B corresponds with rack 12. In the present patent application this path is indicated as the "pole path". In figures 7A and 7B this pole path is clearly discernable since it is physically present in the structure.

Please note that the two coupled degrees of freedom, viz. the rotation and the translation, are not independent and thus the two sub-frames are effectively coupled by only one single degree of freedom. If a certain rotation is imposed on the structure this automatically implies a certain translation, and vice versa.

In e.g. figure 8 the pole path can not immediately be seen. It needs some additional study and some inspection work on the drawing table to assess the position and form the pole path.

The invention in its practical embodiment for e.g. ice skate frames is in a preferred embodiment shown in figure 21 (schematically) and 32A, 32B, 33A, 33B in practice. Figure 35 shows in detail the actual positions of the rotation axes. The accompanying pole path is shown in figure 36. In this figure the pole path is shown in parameter representation. It will immediately be clear that this pole path representation in this parameter structure implies a strictly defined mathematical functional relation between the relative rotation of the sub-frames and their relative position, corresponding with a rotation degree of freedom and a translation degree of freedom.

I do hope that the above brief comments sufficiently explain that independent claim 1 on file is correctly drafted in the two-part form relative to the cited prior art, which is acknowledged to be EP-A-0 192 312.

The Hague, June 6, 1997

5.

The characterizing portion of the two-part claim 1 is novel relative to the cited prior art.

Now that in my conviction novelty has unambiguously assessed, the further argumentation should focus on inventive step, as far as necessary.

In the preamble to the description of the present patent application it has been made clear that the invention requires the two coupled degrees of freedom in order to allow the possibility of bending the foot of the user of the sporting device in a manner which is similar to the bending of the foot that takes place during e.g. walking. In this way it is achieved that a stable thrust is ensured in combination with the best effective use of the relevant muscles.

Thus, the invention provides for a structure that clearly provides a solution for a known limitation of the prior art. Tests have proven that the basic technical philosophy behind the structure of the invention indeed is correct and that e.g. professional skaters have substantially improved their effective speeds expressed in terms of the lowest possible times necessary for a certain distance.

On basis of this argumentation I believe that also the second criterium for patentability, inventive step, is fulfilled.

Since there can be no doubt whatsoever relative to industrial applicability it would seem to me that all requirements for patentability are thus fulfilled.

I would appreciate it to first receive your comments on my argumentation. I will subsequently file new documents in accord with paragraphs (c), (d), (e) of your Written Opinion.

ARNOLD - SIEDSMA -

The Hague, June 6, 1997

6.

I look forward to receiving your next-following Written Opinion.

The representative,

Schumann, Bernard Herman Johan

ARNOLD SIEDSMA

ATTORNEYS AT LAW PATENT ATTORNEYS

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Ms mr L.A.C. Beukers

Mr P.P.J.M. Verhaag

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34, Chemin des Colombettes
1211 Geneva 20, Switzerland

U R G E N T

BY FACSIMILE

(Confirmation copy mailed)

L, per expresse verstuurd.

P.O.Box 18558, NL-2502 EN THE HAGUE, March 5, 1997

Our ref.: X Sch/EN/9r-PCT

Your ref.: --

Re: international patent application
no. PCT/NL96/00209

Name: Gierveld Beheer B.V.

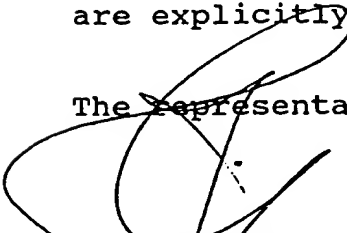
In the above patent application I have been notified
by applicants that two additional inventors have to
be mentioned in accord with the below information.

* Hol, Diederik Hendrik Alewijn
Bovenweg 16
NL-6721 HW BENNEKOM

* Otten, Egbert
Verlengde Grachtstraat 19
NL-9717 GD GRONINGEN

Thus, these two inventors have also to be mentioned as
applicants for the United States. Applicants have
explicitly asked me to beg you to issue a new
publication of the application in which all inventors
are explicitly mentioned on the front page.

The Representative,


Van den Heuvel, Henricus Theodorus
for: Schumann, Bernard Herman Johan

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From the INTERNATIONAL BUREAU

PCTCOMMUNICATION IN CASES FOR WHICH
NO OTHER FORM IS APPLICABLE

20 MARCH 1997

To:

SCHUMANN, Bernard, Herman, Johan
Arnold & Siedsma
Sweelinckplein 1
NL-2517 GK The Hague
PAYS-BAS

Date of mailing (day/month/year) 13 March 1997 (13.03.97)	
Applicant's or agent's file reference X Sch/EN/9R	REPLY DUE see paragraph 1 below
International application No. PCT/NL96/00209	International filing date (day/month/year) 24 May 1996 (24.05.96)
Applicant GIERVELD BEHEER B.V. Gierveld, Johan et al	

1. ☐ REPLY DUE within _____ months/days from the above date of mailing
- ☐ NO REPLY DUE, however, see below _____
- ☐ IMPORTANT COMMUNICATION
- ☐ INFORMATION ONLY

2. COMMUNICATION:

The International Bureau is in receipt of your fax dated 05 March 1997 requesting to add two additional applicant/inventors to the above mentioned international application.

Please find herewith the notifications of the recording of this change.

Furthermore, please be informed that, as a general rule, changes under PCT Rule 92bis are not subject to a new publication. Copies of the notification PCT/IB/306 are sent to the Authorities and designated/elected Offices concerned.

The International Bureau of WIPO 34, chemin des Colombettes 1211-Geneva 20, Switzerland	Authorized officer Peggy Steunenbergh
Facsimile No. (41-22) 740.14.35	Telephone No. (41-22) 730.91.11

PCT COOPERATION TREATY

PCT

NOTIFICATION OF THE RECORDING
OF A CHANGE(PCT Rule 92bis.1 and
Administrative Instructions, Section 422)

From the INTERNATIONAL BUREAU

To:

SCHUMANN, Bernard, Herman, Johan
Arnold & Siedsma
Sweelinckplein 1
NL-2517 GK The Hague
PAYS-BAS

Date of mailing (day/month/year) 11 March 1997 (11.03.97)	IMPORTANT NOTIFICATION
Applicant's or agent's file reference X Sch/EN/9R	
International application No. PCT/NL96/00209	International filing date (day/month/year) 24 May 1996 (24.05.96)

1. The following indications appeared on record concerning:

☒ the applicant ☒ the inventor ☐ the agent ☐ the common representative

Name and Address	State of Nationality	State of Residence
	Telephone No.	
	Facsimile No.	
	Teleprinter No.	

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3. Further observations, if necessary:
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INTERNATIONAL SEARCH REPORT

International Application No.

NL 96/00209

A. CLASSIFICATION OF SUBJECT MATTER

IPC 6 A63C1/28

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 A63C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	NL,A,8 702 068 (VAN OOIJEN) 3 April 1989 see page 3, paragraph 2 - paragraph 3; figure 5	1,3
A	EP,A,0 192 312 (VAN INGEN SCHENAU ET AL) 27 August 1986 see column 2, paragraph 1; figures 4,6	1,3
A	FR,A,2 659 534 (SALOMON SA) 20 September 1991 see figures 1,3	1
A	US,A,3 749 413 (NICOLSON) 31 July 1973 see figures 3,6,10	1
A	DE,A,811 095 (THOMAE ET AL) 14 June 1951 see figure 3	1

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents:

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
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- *O* document referring to an oral disclosure, use, exhibition or other means
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- *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
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- * & * document member of the same patent family

Date of the actual completion of the international search

27 September 1996

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Name and mailing address of the ISA

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Steezman, R

INTERNATIONAL SEARCH REPORT

on patent family members

International Application No.

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
NL-A-8702068	03-04-89	NONE	
EP-A-192312	27-08-86	NL-A- 8500483	16-09-86
		NL-A- 8503403	01-07-87
		JP-A- 61247485	04-11-86
FR-A-2659534	20-09-91	CA-A- 2038315	17-09-91
US-A-3749413	31-07-73	NONE	
DE-A-811095		NONE	

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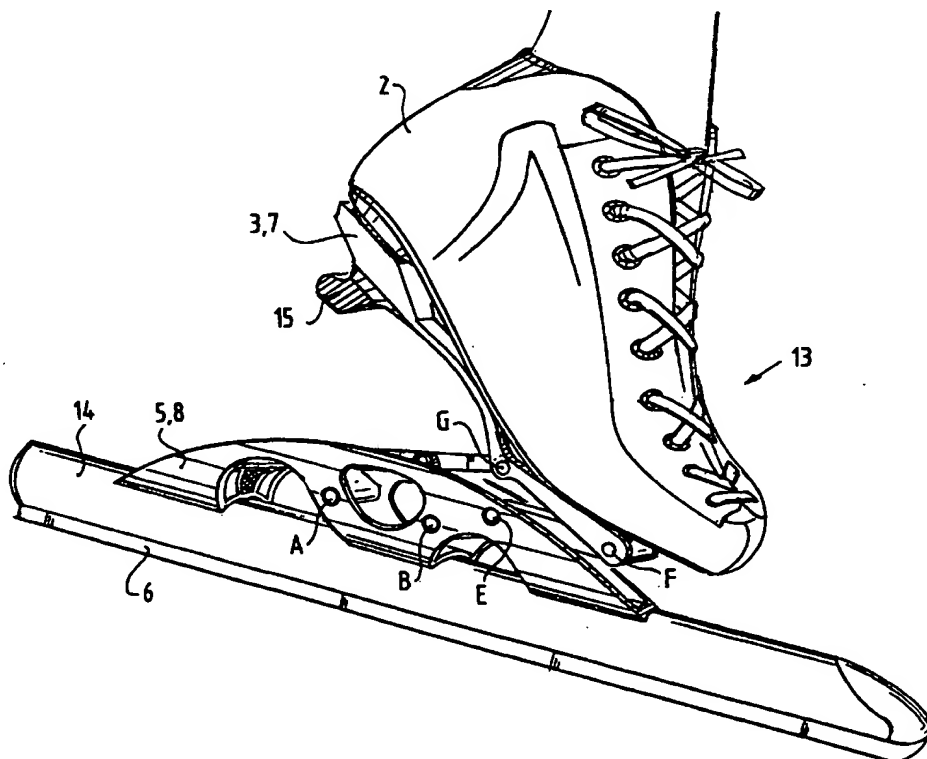
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*With international search report.**Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.**In English translation (filed in Dutch).*

(54) Title: SPORT DEVICE

(57) Abstract

The invention relates to a frame for a sporting device for coupling to a shoe, such as a ski which is slidable or rollable by means of wheels, in particular a cross-country ski, or a skate frame for an ice-skate or roller-skate, which frame comprises: an upper sub-frame with means for coupling to a shoe to be worn by a user; a lower sub-frame which is coupled via a pivot mechanism to said upper sub-frame for pivoting in a main plane and which is provided with or adapted to be provided with a runner or wheels; and resetting spring means for urging both sub-frames toward each other. The frame according to the invention has the special feature that the sub-frames are mutually pivotable and translatable in the said main plane. A specific embodiment has the feature that the sub-frames form part of a mechanism comprising at least four mutually pivotable and/or translatable (optionally theoretical) rods.



SPORT DEVICE

The invention relates to a frame for a sporting device for coupling to a shoe, such as a ski which is slidable or rollable by means of wheels, in particular a cross-country ski, or a skate frame for an ice-skate or roller-skate, which frame comprises:

an upper sub-frame with means for coupling to a shoe to be worn by a user;

a lower sub-frame which is coupled via a pivot mechanism to said upper sub-frame for pivoting in a main plane and which is provided with or adapted to be provided with a runner or wheels; and

resetting spring means for urging both sub-frames toward each other.

Such a frame is known for a skate and has been commercially available for many years under the name "tumble skate".

The object of such a variable construction is to make the force exerted by the skater on the ice or the ground as great as possible so as to thereby maximize the effectiveness of muscle power and the speed to be thus achieved.

It has been found that while the known skate has the advantage of a very simple construction it is not able to realize the stated objective.

An important cause of this technical deficiency of the known skate lies in the fact that both sub-frames are connected for mutual pivoting in a zone located in the region of the tip of the shoe. While a large pivot angle can thereby be realized, the force to be exerted has an effective point of engagement located so far from the front of the foot that an effective force transfer is illusory.

The invention has for its object to embody a skate frame such that the effectiveness of the force

transfer is made as great as possible, on the one hand by choosing, optionally in variable manner, the effective point of engagement of the thrust forces during skating on the basis of physiological and ergonomic

5 considerations and on the other by allowing the user to use the calf-muscles during skating, which is not the case with known, non-variable skates and which is the case to only very small, almost negligible extent with the described known tumble skate.

10 What is of great importance is that the frame allows the possibility of bending the foot in a manner which is similar to that in a walking movement. This is important for a stable thrust and for the best possible effective use of the relevant muscles. The prior art
15 skates are not capable of this.

In respect of the above the frame according to the invention has the special feature that the sub-frames are mutually pivotable and translatable in the said main plane.

20 A specific embodiment has the feature that the sub-frames form part of a mechanism comprising at least four mutually pivotable and/or translatable (optionally theoretical) rods. It must be appreciated that the term "rod mechanism" as used above must be interpreted in a
25 broad sense. A translation in a particular direction can for instance be seen as a rotation of an infinitely long rod extending in transverse direction of the translation.

The upper sub-frame can be embodied such that the position of the shoe relative to this upper sub-frame
30 is adjustable. Longitudinal adjusting means can be present for this purpose.

A frame is recommended which has only one degree of freedom.

A degree of freedom is defined as a movement
35 possibility of a mechanism or a connection which can be designated with only one variable, for instance the pivot angle an element can make round a hinged connection. In this case the degrees of freedom are defined in relation

to the relative movement possibilities of the upper sub-frame and the lower sub-frame.

The other aspect of the invention relates to the fact that the frame has a (real or virtual) pole path. A pole path is the set of instantaneous centres of rotation or poles of the upper sub-frame relative to the lower sub-frame. Attention is drawn to the fact that for a well-defined pole path the frame may only have one degree of freedom.

10 The embodiment is recommended in which the pole path is substantially straight.

This latter variant can advantageously have the special feature that the pole path extends substantially horizontally.

15 At least for sporting devices with foot bending, this latter variant is preferably embodied such that the pole path extends between a starting position under the ball of the foot of a user in the rest position of the frame, and an end position under the big toe of the user in the extreme outward pivoted position of the frame.

20 The best results are obtained with an embodiment in which at constant relative angular speed of the sub-frames the speed of the pole along the pole path increases from the starting position to the end position. In preference the speed is initially substantially constant while the speed increases toward the end of the path.

25 A specific variant has the special feature that a frame is a member of the family in accordance with the table below, in which the first number designates the number of (optionally theoretical) rods, p1 designates the number of connections with one degree of freedom, p2 designates the number of connections with two degrees of freedom and # designates the presence of a well-defined pole path and therewith the suitability for a sporting device with foot bending:

	Family/member	Figure	p1	p2	suitable
	2 / 1	8	0	2	#
	3 / 1	9	2	1	
5	3 / 2	10	1	1	
	3 / 3	11	0	1	
	4 / 1	12	4	0	#
	4 / 2	13	4	0	#
	4 / 3	14	3	2	#
10	4 / 4	15	2	4	#
	4 / 5	16	1	6	#
	4 / 6	17	0	8	#
	5 / 1	18	5	1	#
	5 / 2	19	4	3	#
15	5 / 3	20	3	5	#
	5 / 4	21	2	7	#
	5 / 5	22	1	9	#
	5 / 6	23	0	11	#
	6 / 1	24	7	0	#
20	6 / 2	25	6	2	#
	6 / 3	26	5	4	#
	6 / 4	27	4	6	#
	6 / 5	28	3	8	#
	6 / 6	29	2	10	#
25	6 / 7	30	1	12	#
	6 / 8	31	0	14	#

A preferred choice of the available mechanisms provides a frame in which the frame comprises seven, eight, nine or ten pivot axes.

Probably the best compromise in respect of kinematic requirements, weight and simplicity is realized with a frame in which the frame comprises seven pivot axes.

All the stated criteria are satisfied with an embodiment in which the frame is constructed as according to figure 24 and (at least the relative) dimensioning according to figure 35.

In order to be able to withstand the very great forces which occur the frame must be mechanically very strong. It is particularly important for the frame to have torsional stiffness.

5 The following requirements can further be made of the frame for use in a skate with foot bending:

 * the maximum height is about 30 mm. This maximum is determined by the space between the support tube for the runner and the shoe.

10 * the maximum length is about 150 mm. The heel support forms the criterion in this respect.

 * the shafts forming the pivot axes may not be closer together than roughly 10 mm, since problems of strength might otherwise occur.

15 The invention will now be elucidated with reference to the annexed drawings. In the drawings:

 figures 1A, B and C show schematically a known tumble skate in three respective pivoting positions;

 figures 2A, B and C show a possible variant of
20 the known tumble skate, wherein the hinge is displaced to the rear, or under the ball of the foot;

 figures 3, 4 and 5 show in schematic side view three possible connections in the flat plane with one degree of freedom;

25 figure 6 shows a connection in the flat plane with two degrees of freedom;

 figure 7a shows schematically the contact between two profiles;

 figure 7b shows a further developed embodiment
30 of the connection of figure 7a;

 figures 8-31 are schematic views of the family members of the table of claim 9;

 figures 32A, B show perspective views in pivoted situation of a preferred frame as according to
35 figure 24 (family member 6/1);

 figures 33A, B show the skate of figure 32, partly in side view, partly in lengthwise section,

respectively in the rest position and the extreme pivot position of 48° ;

figure 34 is a diagram elucidating the structure of the skate according to figures 32 and 33;

5 figure 35 is a graphic representation in cartesian coordinates of the locations of the pivot axes; and

figure 36 shows the change in position in X and Y direction of the pole as a function of the pivot angle
10 of the skate according to figures 32-35.

Figures 1A, 1B and 1C show schematically a known tumble skate 1 in respectively a rest position, an intermediate pivot position and an extreme pivot position. The skate comprises a shoe 2, an upper sub-
15 frame 3 connected to the sole thereof, a lower sub-frame 5 in tubular form connected to sub-frame 3 at the front via a hinge 4 and a runner 6 arranged on sub-frame 5.

Figure 2 shows a possible variant of skate 1. This skate 9 is modified in the sense that the axis of
20 the hinge 4' lies further to the rear than that of hinge 4 according to figure 1. This could result in an improvement in respect of force transfer. The hinge 4' effectively lies roughly under the ball of the foot of a user. While a small improvement in the effectiveness of
25 the force transfer can hereby be realized in combination with a simple construction, this embodiment has the drawback that the pivot angle is necessarily limited. This becomes particularly clear with reference to figure 2C.

30 It is noted generally that, where possible and appropriate, the same components are designated with the same reference numerals. This applies not only to identical components but also, and particularly, for functionally corresponding components.

35 Figure 3 shows a connection between two elements 7, 8 (corresponding respectively with upper sub-frame 3 and lower sub-frame 5). This connection in the flat plane has only one degree of freedom.

Figure 4 likewise shows a connection between two elements 7, 8 with one degree of freedom. As the figure shows, these elements are mutually connected by a rectilinear guide so that they have only a degree of freedom of translation.

Figure 5 shows a connection between elements 7 and 8 comprising a curve guide which effectively implies a hybrid of the hinge connection of figure 3 and the rectilinear guide of figure 4. It will be apparent that, despite there being only one degree of freedom, there is both a translation and a rotation.

Figure 6 shows an embodiment of a coupling between elements 7 and 8 with two degrees of freedom. This is a hinge in a guide path.

Figure 7A shows the coupling between two profiles with both a translation and rotation degree of freedom.

The skate 10 according to figure 7B comprises two mutually co-acting gear racks 11, 12 which form part of the respective elements 7, 8. It will be apparent that due to a displacement from the rest position designated with 2, 3 of shoe and upper sub-frame to the pivot position designated with 2', 3' both a rotation and a translation occur, wherein the centre of rotation follows a path corresponding with the rack 12. This is therefore a real pole path.

For a well-defined pole path the frame may have only one degree of freedom. It is pointed out once again that the invention relates exclusively to the degrees of freedom of the above mentioned elements 7 and 8, corresponding respectively to an upper sub-frame, which is or can be coupled to a shoe, and a lower sub-frame to which a runner, wheels, a ski-beam or the like is/are or can be connected.

Figures 8-31 show the family members as stated in the table included above.

Attention is drawn to the fact that, as already stated, the presence of a pole path is required for the

devices applicable within the scope of the invention for sporting devices with foot bending. The embodiments of figures 9, 10 and 11 therefore do not meet this requirement.

5 Of particular importance is the embodiment according to figure 24, family member 6/1. This embodiment comprises six rods and seven pivot axes. The principle sketched in figure 24 will be discussed below as a concrete example with reference to the preferred
10 embodiment of the invention, i.e. with reference to figures 32A, B, 33A, B, 34, 35 and 36.

 In respect of the table shown and the associated figures 8-31 it is noted that, in addition to the above mentioned families of rod mechanisms, families
15 can also be formulated with more than six rods/elements per mechanism.

 For each hinge connection in the above mentioned families a rectilinear guide can also be chosen.

20 For each hinge in a guide path a contact can also be chosen between two profiles, wherein it is noted with reference to figure 7A that load is not possible in all directions.

 For each hinge in a guide path a curved guide
25 path can also be chosen, which results in the pole path of an element being influenced.

 The twenty-four mechanisms according to the figures 8-31 and their variants as according to the comments above are not all equally suitable to satisfy
30 the stringent requirements which can be made of the pole path of an element. The elements which are in principle suitable are designated with # in the table.

 Rectilinear guides, curve guides and pivot
35 guides are less capable in practice of holding the mechanism in the defined plane than simple hinges.

 Experience with families of systems as specified above has demonstrated that with four hinges the stringent requirements for kinematics, weight,

simplicity and well-defined pole path cannot be met. The requirements can be met in very close approximation with seven hinges, while with ten hinges the requirements can be satisfied virtually perfectly.

5 Partly with a view to a low weight, simplicity of construction and price, the mechanism according to figure 24, family member 6/1, is currently considered the most suitable. The following figures all relate thereto.

10 Figures 32A and B show a skate 13 based on the principle outlined in figure 24. Corresponding with figure 24, the upper sub-frame is designated with a double reference 3, 7 in order to make clear the functional relation between the upper sub-frame according to figures 1 and 2 and the element 7 of figure 24.

15 Similarly, the lower sub-frame is designated with 5, 8. It should be appreciated in this respect that the lower sub-frame 5, 8 is connected by screws to a tubular frame part 14 which bears the runner 6.

20 In figures 32A and B, 33A, B and 34 are shown only the seven hinges A, B, C, D, E, F and G. The six rods are designated, insofar as necessary, with the relevant indications of these hinges. It will be apparent that the rod A B C is formed by the lower sub-frame 5, 8, 14, including the tubular frame part 14. The upper sub-

25 frame G F is coupled to the sole of the shoe 2.

 Figures 33A and B in particular show clearly the diverse positional changes during pivoting of the diverse rods and their hinges. Figure 34 shows the position of figure 33A on large scale. Also drawn herein

30 are the displacements of the hinges D, C, G and F during pivoting of the sub-frame 3, 7.

 The above discussed pole path of sub-frame 3, 7, or the rod G F, runs, in accordance with the requirements to be made, practically entirely

35 horizontally from below the ball of the foot to below the big toe of a user, provided the dimensioning specifications are complied with as shown in figure 35 and the table included therein.

In figure 35 the position of each hinge A, B, C, D, E, F, G is indicated in a cartesian coordinate system. Attention is drawn to the fact that the X coordinate of the hinge B can have the indicated value or
5 can display a certain positive deviation, depending on the shoe size of the user. Three shoe sizes can for instance be chosen, wherein the positive deviation relative to the given basic value amounts respectively to about 1.3 and 2.6 mm.

10 Attention is drawn to the fact that the origin of the coordinate system according to figure 35 is chosen randomly on the rear of the lower sub-frame 5, 8. Any other point of this sub-frame 5, 8 could have served as reference, for instance the hinge A. The dimensioning of
15 the whole system A-G can be modified relative to for instance this hinge A, provided the ratios are preserved.

Figure 36 shows in parameter presentation the pole path of the upper sub-frame 3, 7 relative to the lower sub-frame 5, 8. Shown horizontally is the pivot
20 angle in degrees while in vertical direction is shown the positional change of the pivot centre in respectively X direction (Δx) and Y direction (Δy). The graph of figure 36 shows that the change Δy in vertical direction amounts to a few millimetres and reaches roughly zero at the end
25 of the pivot path corresponding with a pivot angle of about 48° .

The positional change of the pole in horizontal direction is designated with Δx . The speed is practically constant up to a of pivot angle of about 35° . After this
30 distance the pole accelerates up to the end position.

Attention is once again drawn to the fact that at a pivot angle of zero the pole is situated roughly under the ball of the foot and at the end is situated under the big toe.

35 Attention is drawn to a resetting spring 115 embodied as helical torsion spring (see figure 33A, B) which is arranged round the shaft of hinge A and exerts a resetting force between the rods ABE (see figure 24) and

AD such that sub-frame 3, 7 is thereby urged to its rest position as shown in figure 33A where a heel element 15 can rest in a tapering stopper surface 16 which forms part of the lower sub-frame 5, 8 and which is covered with an elastic material to thus form a soft stop.

The lower sub-frame 5, 8 can be manufactured by starting from an extruded profile from which parts are removed selectively. All rods of the frame can very suitably be manufactured from aluminium. This material combines a low weight with sufficient strength. The hinges can be manufactured in per se known manner from very wear-resistant materials and combinations thereof.

Attention is drawn to the fact that the resetting spring means are not shown in all the figures. These can be very suitably embodied as a helical draw spring, a torsion spring or a spiral spring. A plurality of springs may also be active in the rod mechanism. The bias and stiffness of the spring means are determined by two considerations. On the one hand, during the inactive phase of a skating stroke, the lower sub-frame must be carried as quickly as possible to the upper sub-frame. On the other hand, the resetting force must not be so great that too considerable a part of the available force is absorbed by the spring means.

It is noted that the comparatively large pivot angle to be realized according to the invention of more than, optionally considerably more than, 20° corresponds with a natural unrolling of the movement of a foot.

The skate according to the invention makes optimal use of the possible rotation of the foot round the ankle. This mobility is designated "plantar flexion" and is essential for a good force transfer.

On the basis of the above very briefly stated considerations it can be anticipated that the skate frame according to the invention can result in essential speed increases.

CLAIMS

1. Frame for a sporting device for coupling to a shoe, such as a ski which is slidable or rollable by means of wheels, in particular a cross-country ski, or a skate frame for an ice-skate or roller-skate, which frame
5 comprises:

an upper sub-frame with means for coupling to a shoe to be worn by a user;

a lower sub-frame which is coupled via a pivot mechanism to said upper sub-frame for pivoting in a main
10 plane and which is provided with or adapted to be provided with a runner or wheels; and

resetting spring means for urging both sub-frames toward each other;

characterized in that

15 the sub-frames are mutually pivotable and translatable in the said main plane.

2. Frame as claimed in claim 1, wherein the sub-frames form part of a mechanism comprising at least four mutually pivotable and/or translatable (optionally
20 theoretical) rods.

3. Frame as claimed in claim 1, wherein the frame has only one degree of freedom.

4. Frame as claimed in claim 3, wherein the frame has a (real or virtual) pole path.

25 5. Frame as claimed in claim 3, wherein the pole path is substantially straight.

6. Frame as claimed in claim 3, wherein the pole path extends substantially horizontally.

7. Frame as claimed in claim 4, wherein the
30 pole path extends between a starting position under the ball of the foot of a user in the rest position of the frame, and an end position under the big toe of the user in the extreme outward pivoted position of the frame.

8. Frame as claimed in claim 3, wherein at
35 constant relative angular speed of the sub-frames the

speed of the pole along the pole path increases from the starting position to the end position.

9. Frame as claimed in claim 4, wherein a frame is a member of the family in accordance with the table below, in which the first number designates the number of (optionally theoretical) rods, p1 designates the number of connections with one degree of freedom, p2 designates the number of connections with two degrees of freedom and # designates the presence of a well-defined pole path and therewith the suitability for a sporting device with foot bending:

	Family/member	Figure	p1	p2	suitable
15	2 / 1	8	0	2	#
	3 / 1	9	2	1	
	3 / 2	10	1	1	
	3 / 3	11	0	1	
	4 / 1	12	4	0	#
20	4 / 2	13	4	0	#
	4 / 3	14	3	2	#
	4 / 4	15	2	4	#
	4 / 5	16	1	6	#
	4 / 6	17	0	8	#
25	5 / 1	18	5	1	#
	5 / 2	19	4	3	#
	5 / 3	20	3	5	#
	5 / 4	21	2	7	#
	5 / 5	22	1	9	#
30	5 / 6	23	0	11	#
	6 / 1	24	7	0	#
	6 / 2	25	6	2	#
	6 / 3	26	5	4	#
	6 / 4	27	4	6	#
35	6 / 5	28	3	8	#
	6 / 6	29	2	10	#
	6 / 7	30	1	12	#
	6 / 8	31	0	14	#

10. Frame as claimed in claim 9, wherein the frame comprises seven, eight, nine or ten pivot axes.

11. Frame as claimed in claim 10, wherein the frame comprises seven pivot axes.

5 12. Frame as claimed in claim 11, wherein the frame is constructed as according to figure 24 and (at least the relative) dimensioning according to figure 35.

13. Frame as claimed in claim 1, wherein the frame has torsional stiffness.

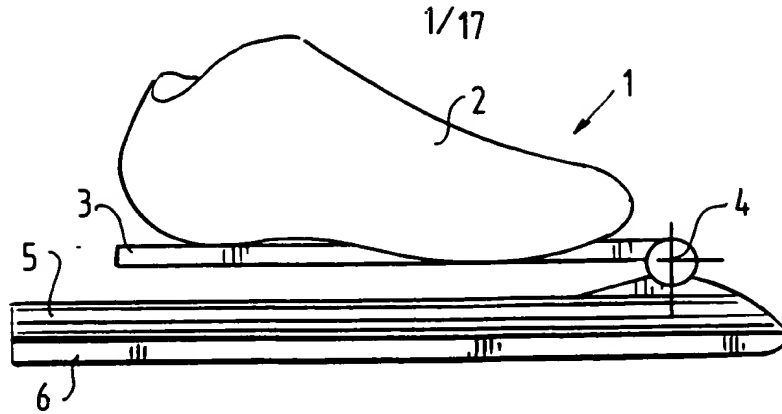


FIG. 1A

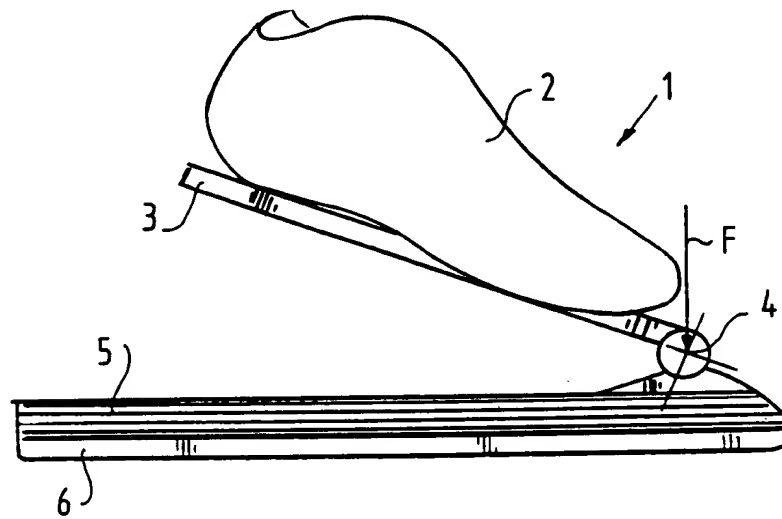


FIG. 1B

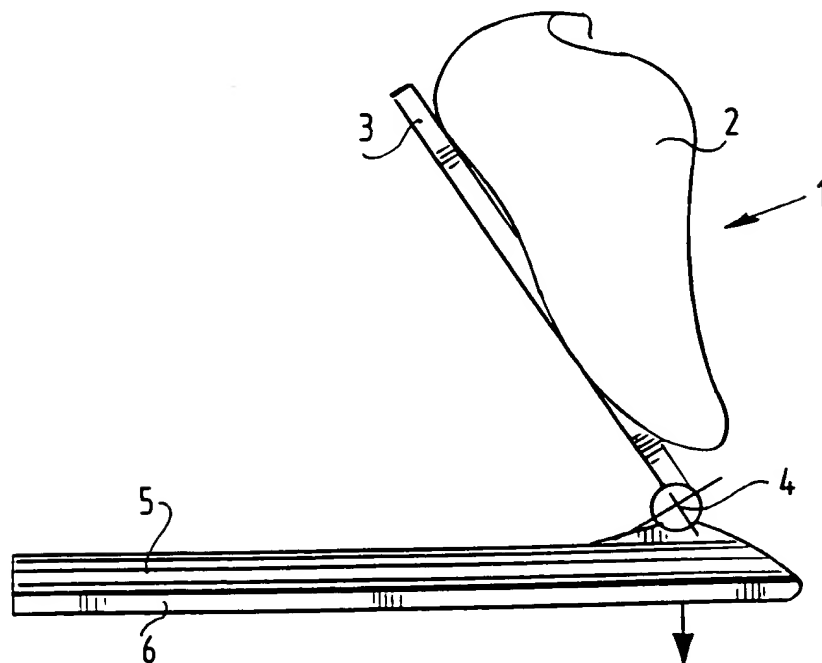


FIG. 1C

2/17

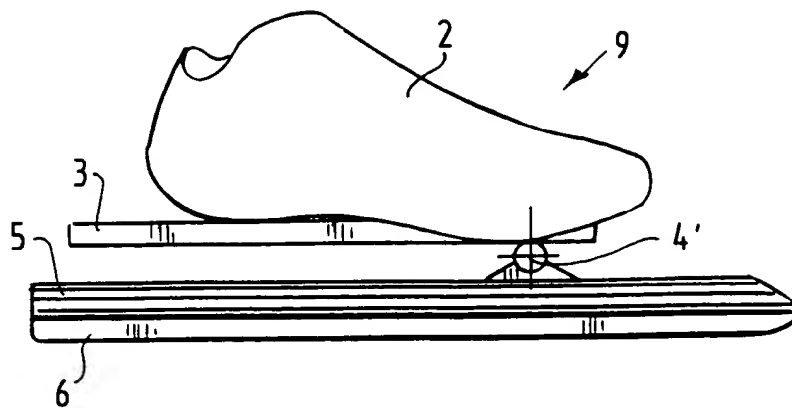


FIG. 2A

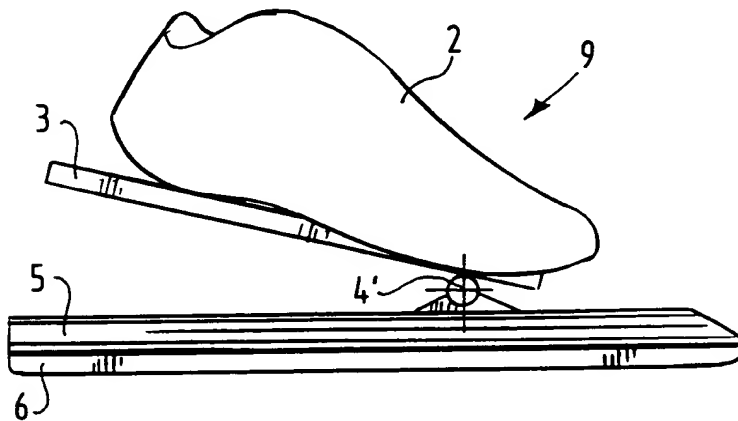


FIG. 2B

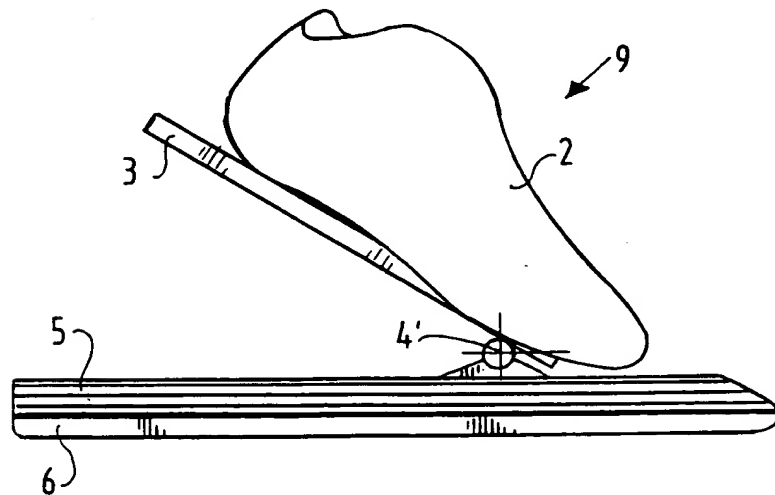
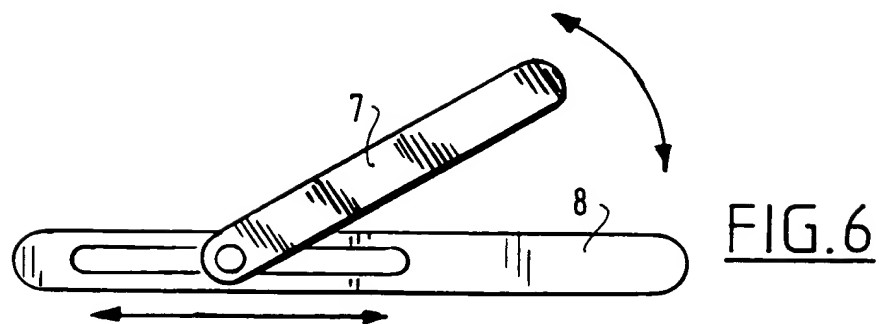
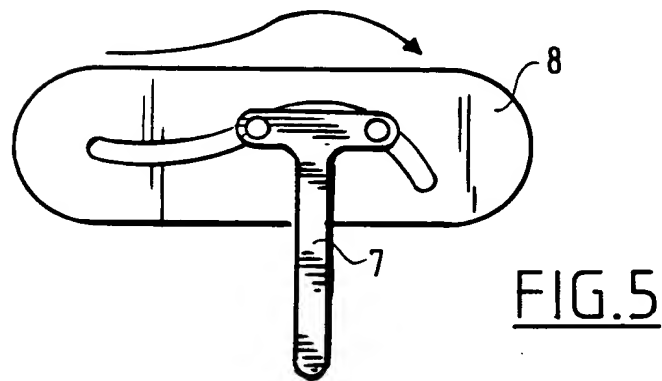
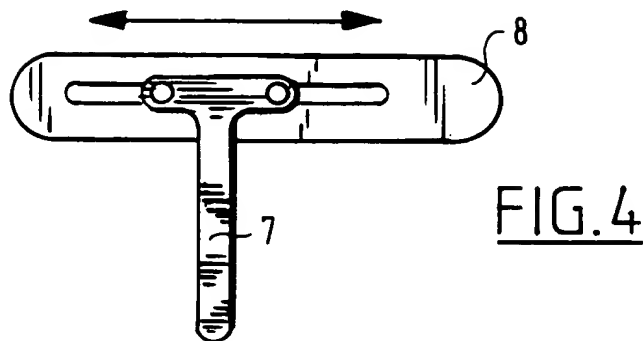
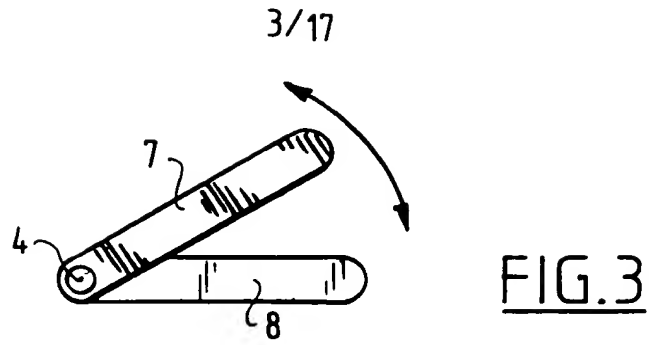
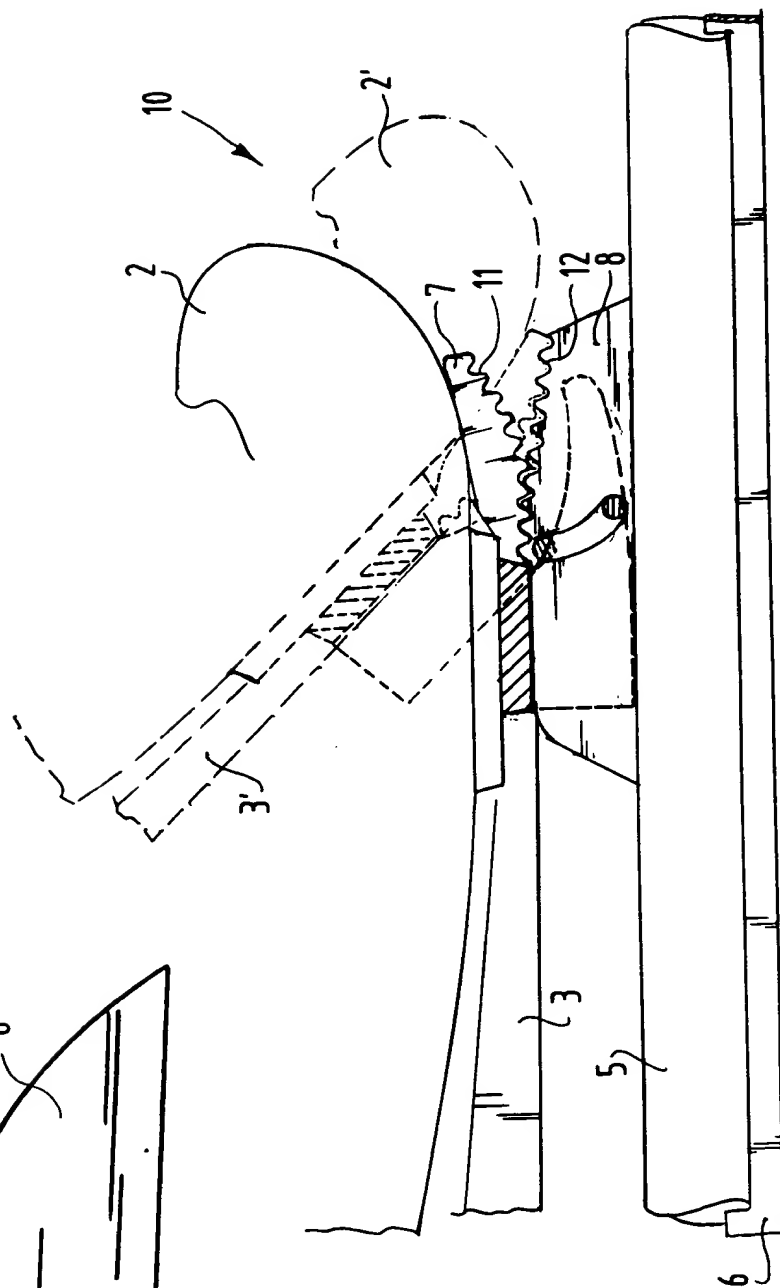
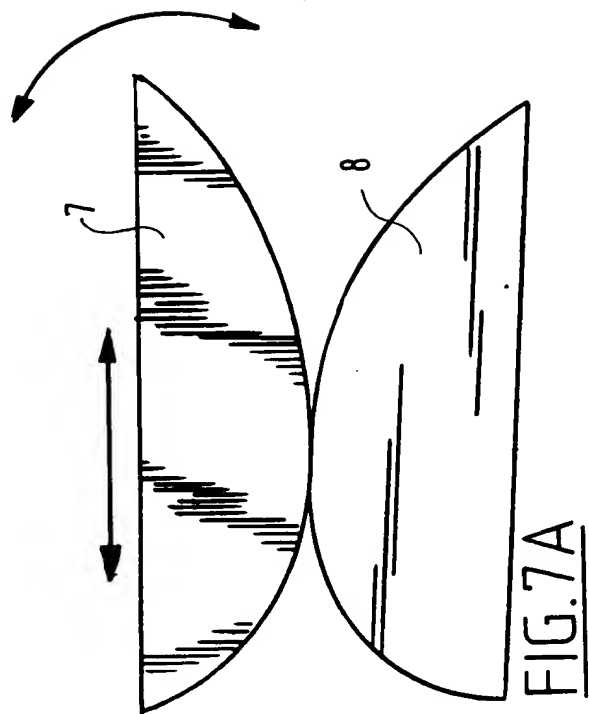


FIG. 2C



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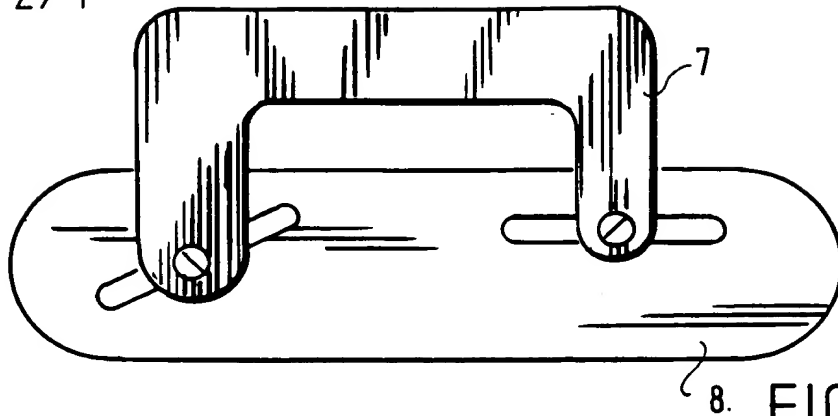


FIG. 8

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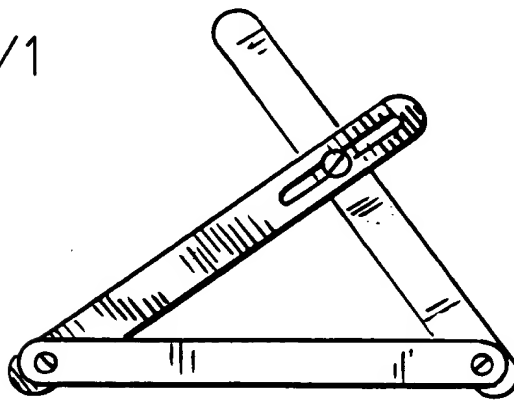


FIG. 9

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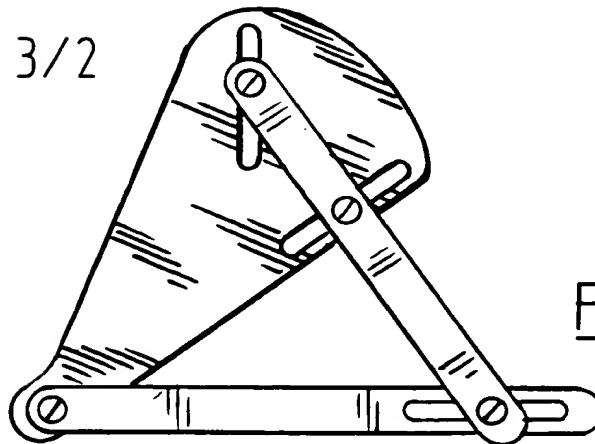


FIG. 10

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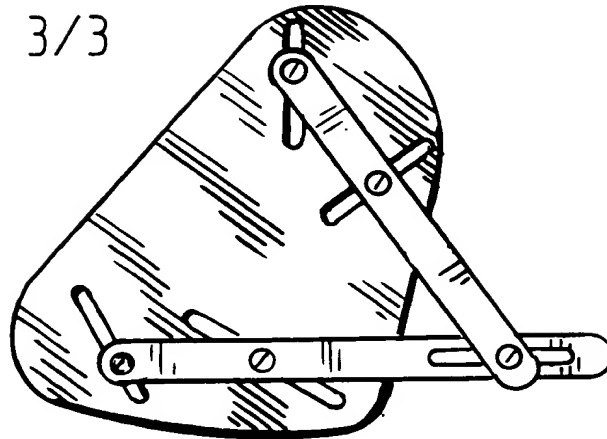


FIG. 11

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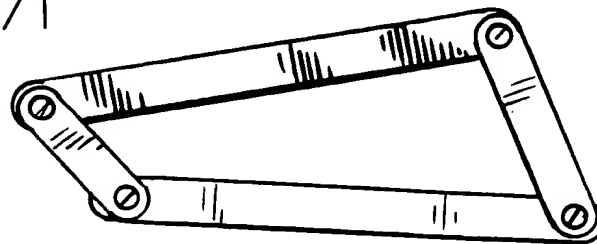


FIG. 12

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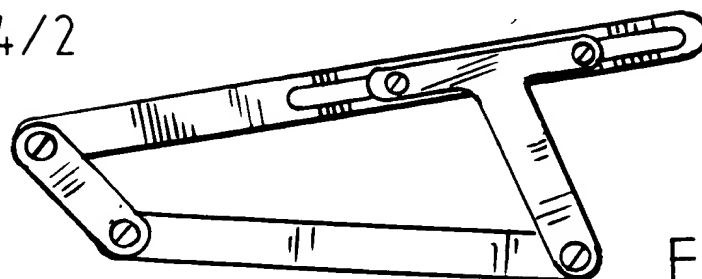
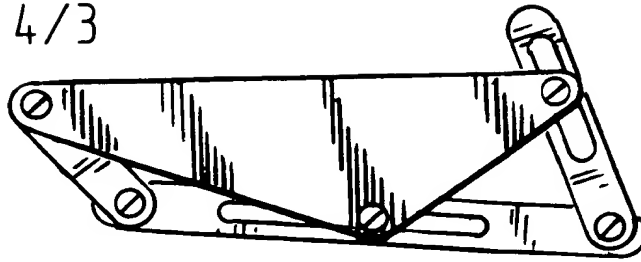


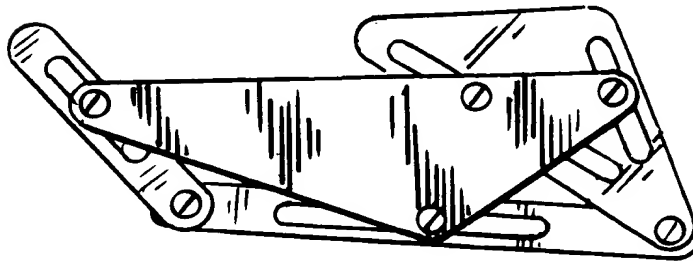
FIG. 13

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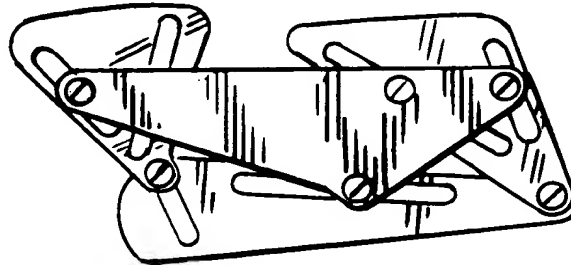
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FIG. 14

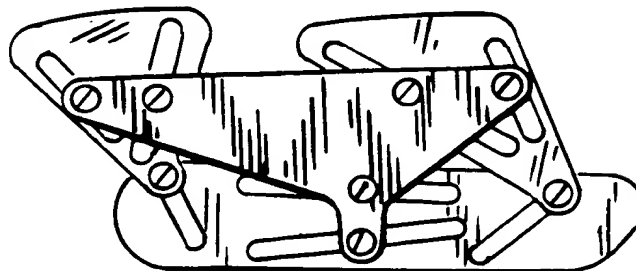
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FIG. 15

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FIG. 16

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FIG. 17

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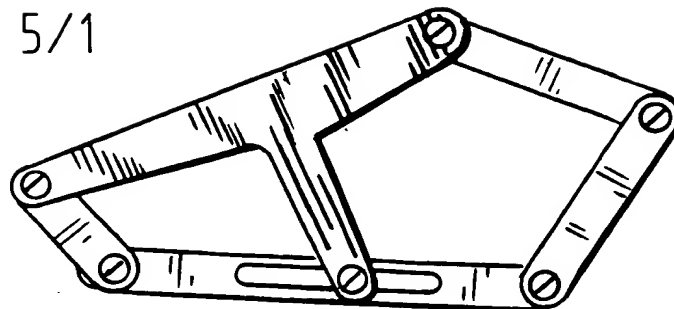


FIG. 18

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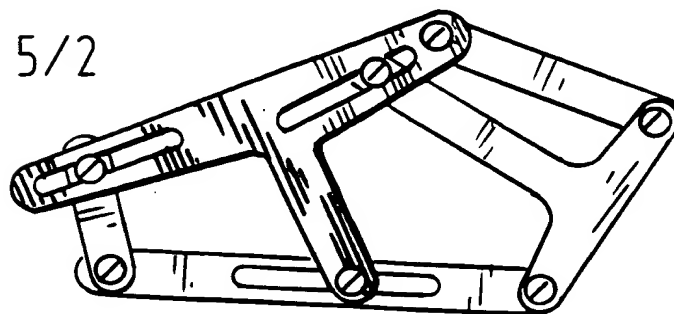


FIG. 19

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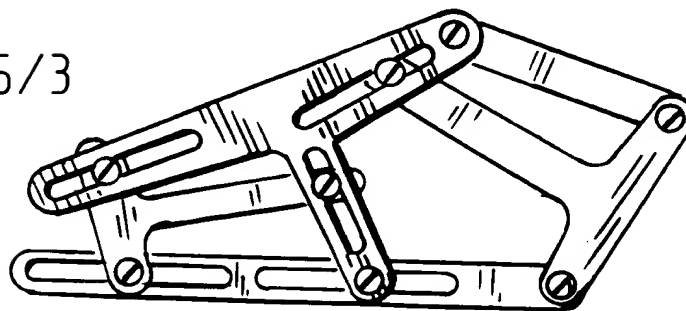


FIG. 20

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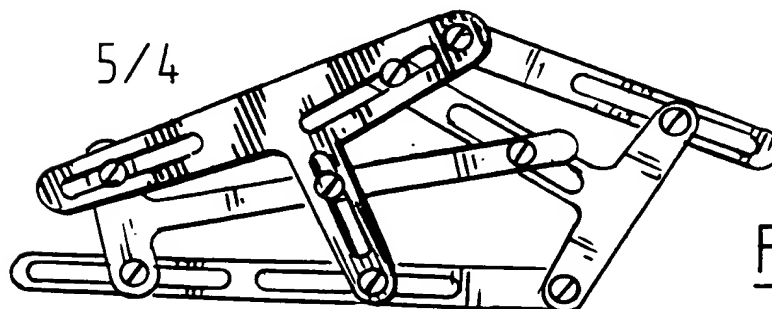


FIG. 21

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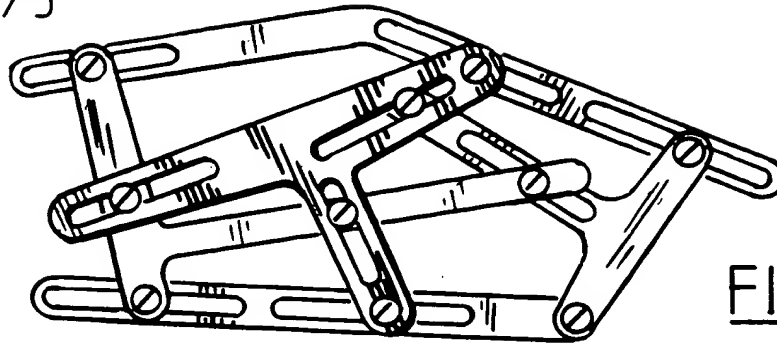


FIG. 22

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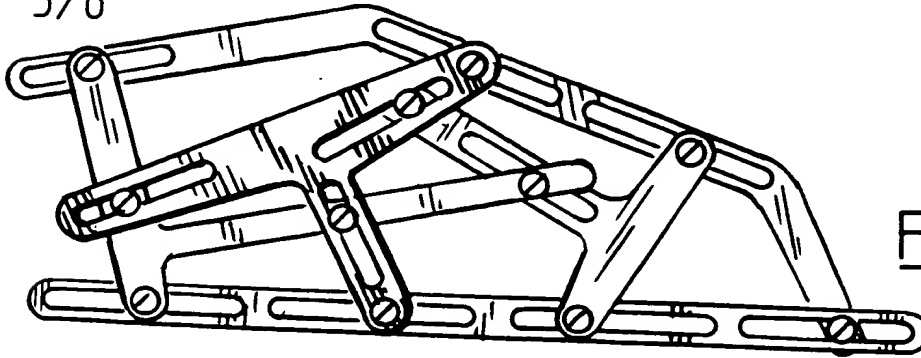


FIG. 23

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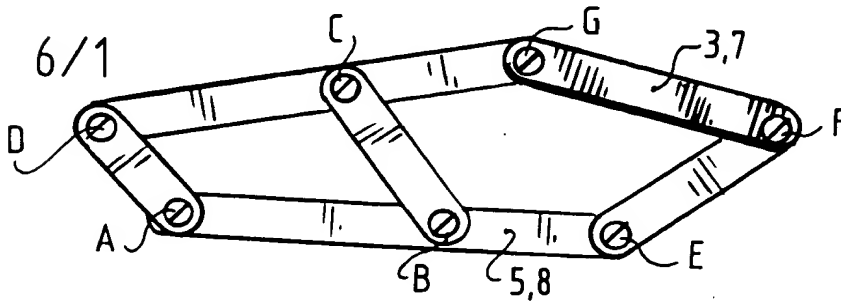


FIG. 24

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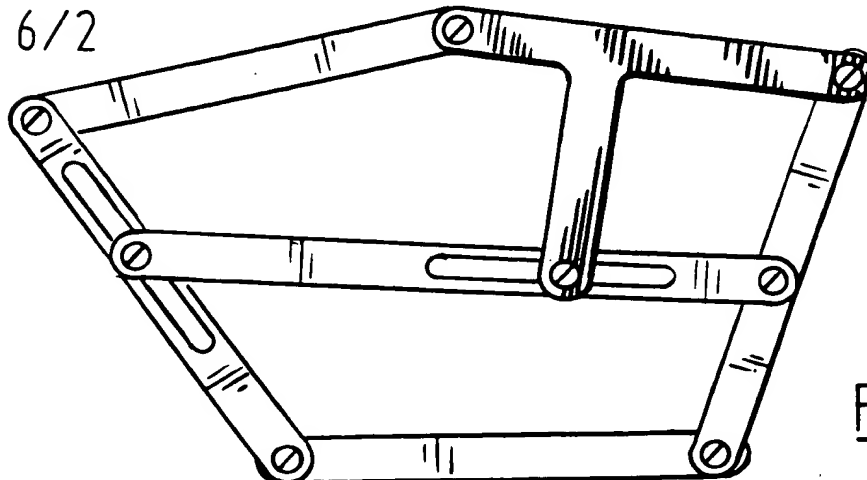
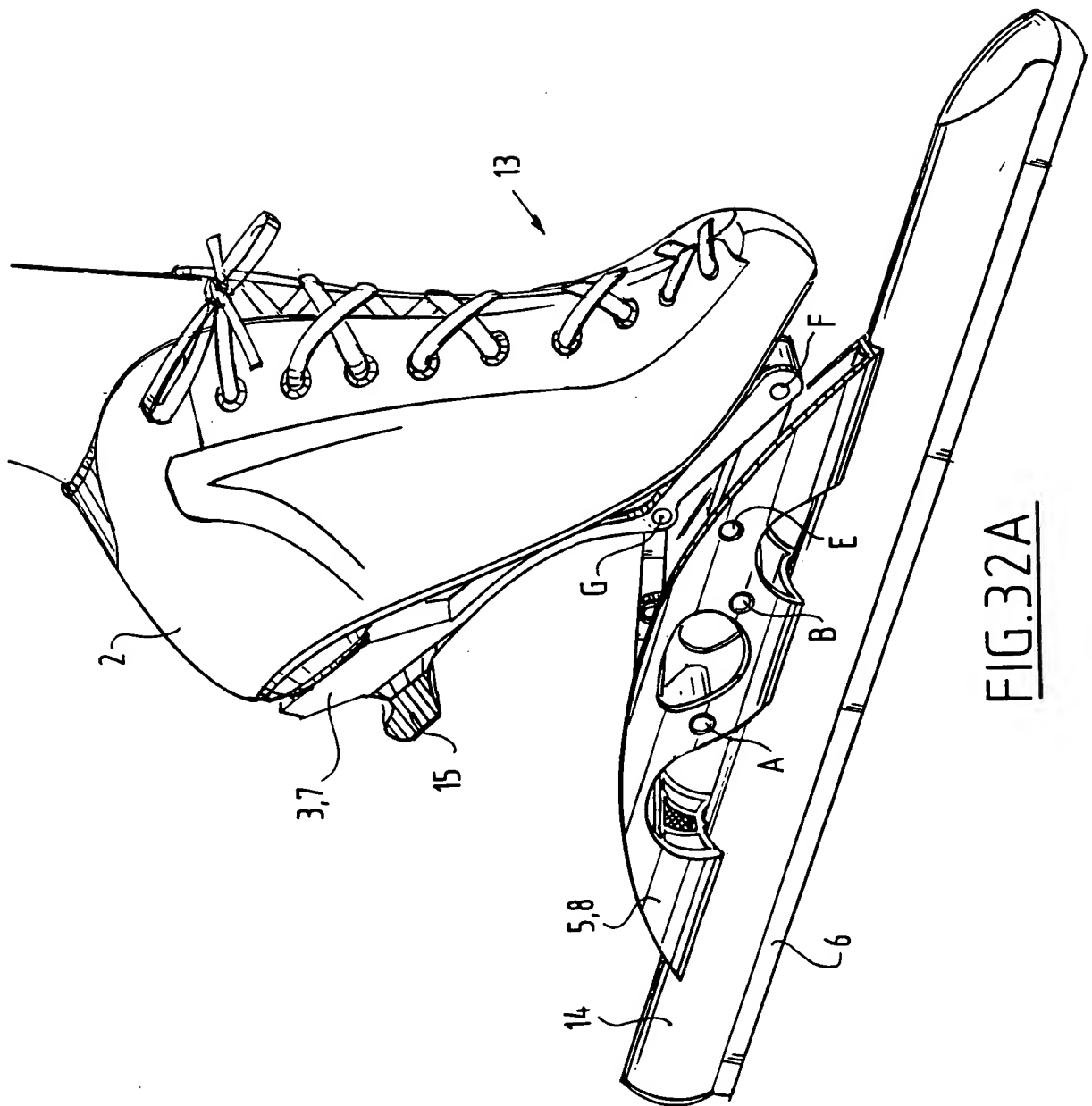


FIG. 25

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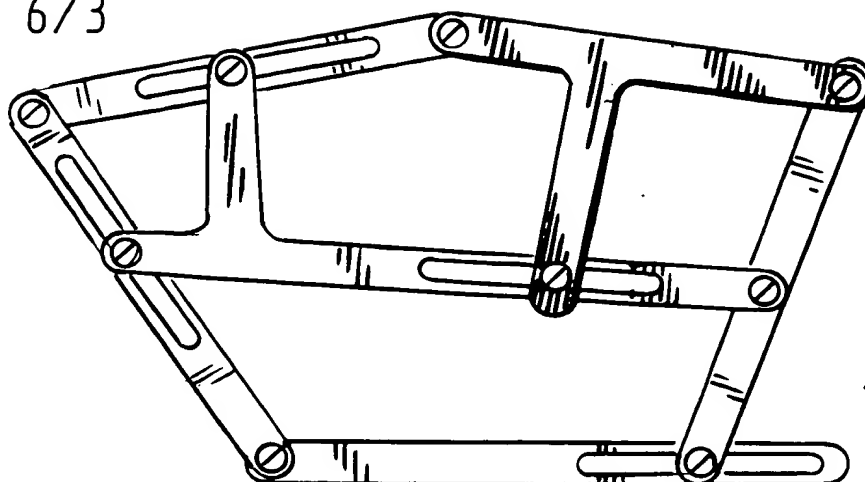


FIG. 26

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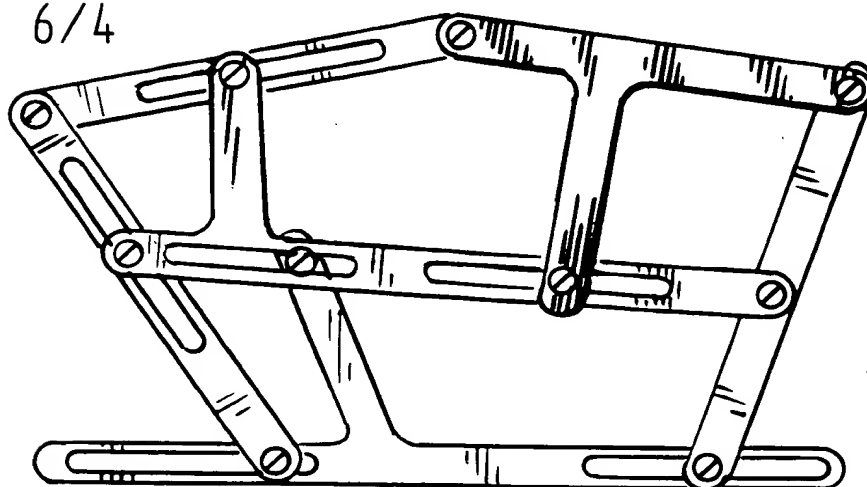


FIG. 27

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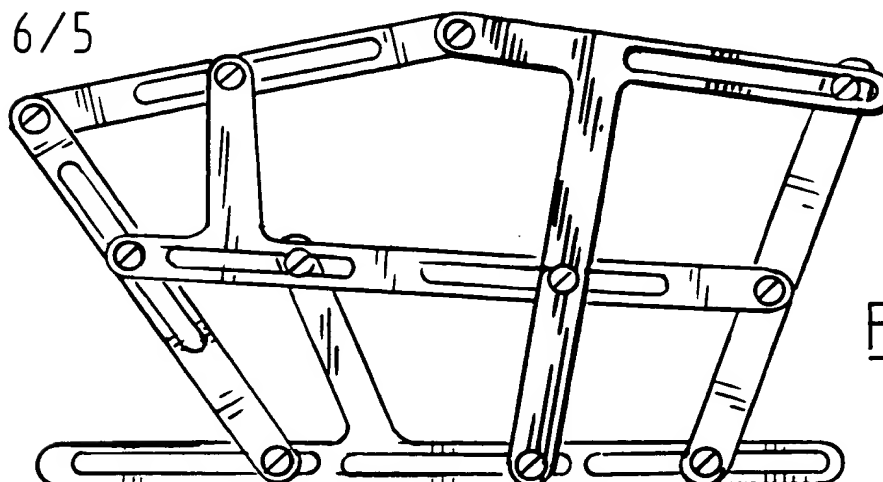


FIG. 28

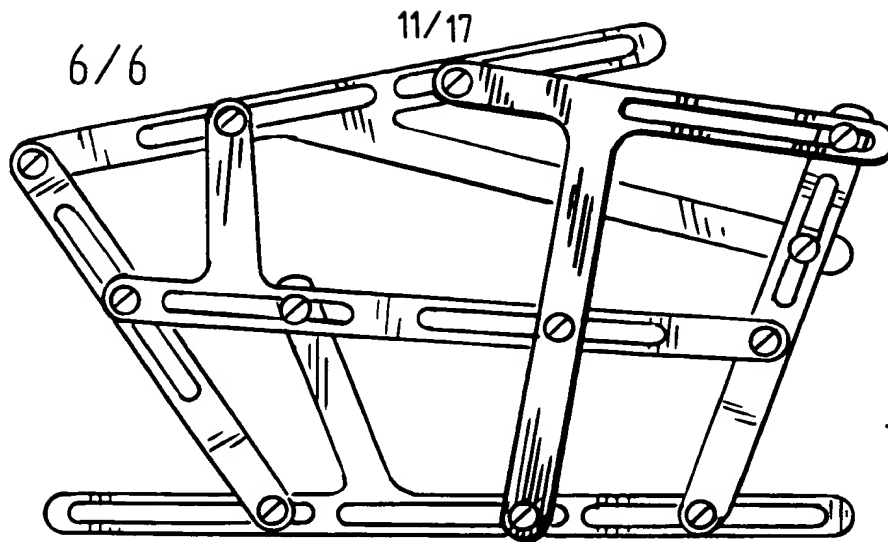


FIG. 29

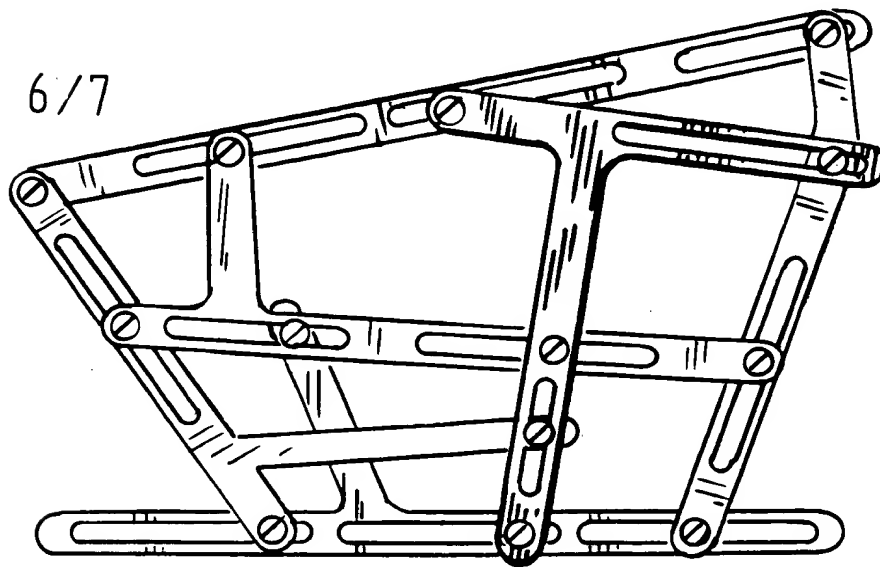


FIG. 30

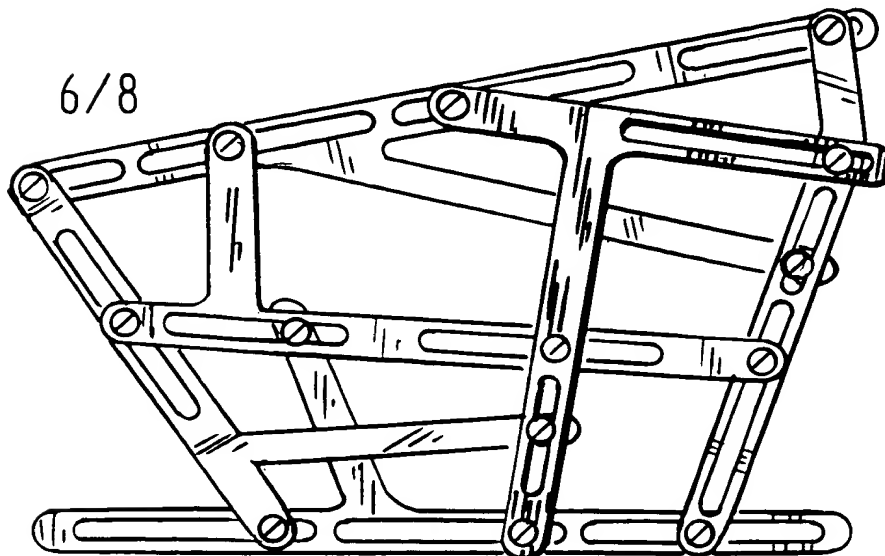


FIG. 31

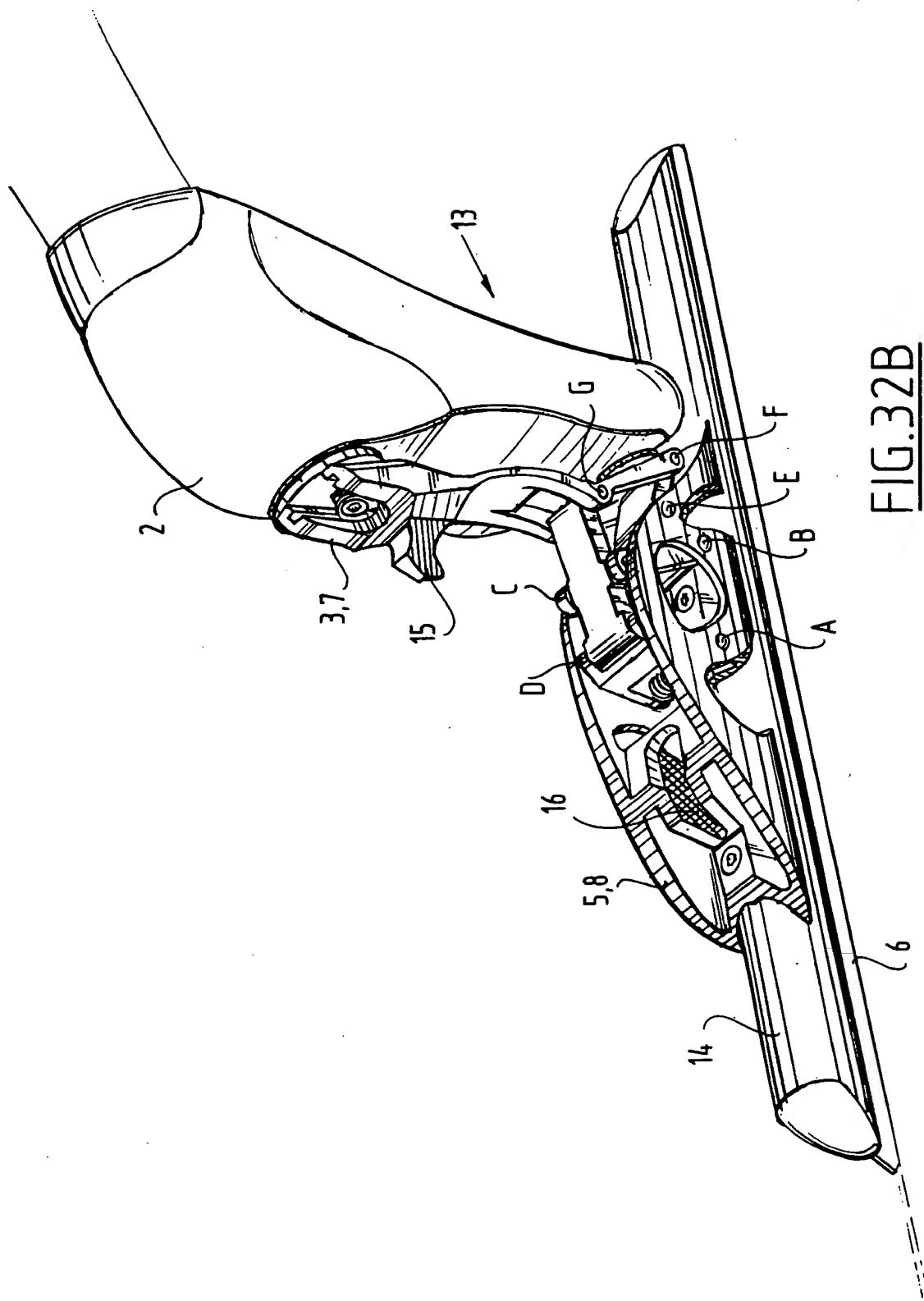


FIG. 32B

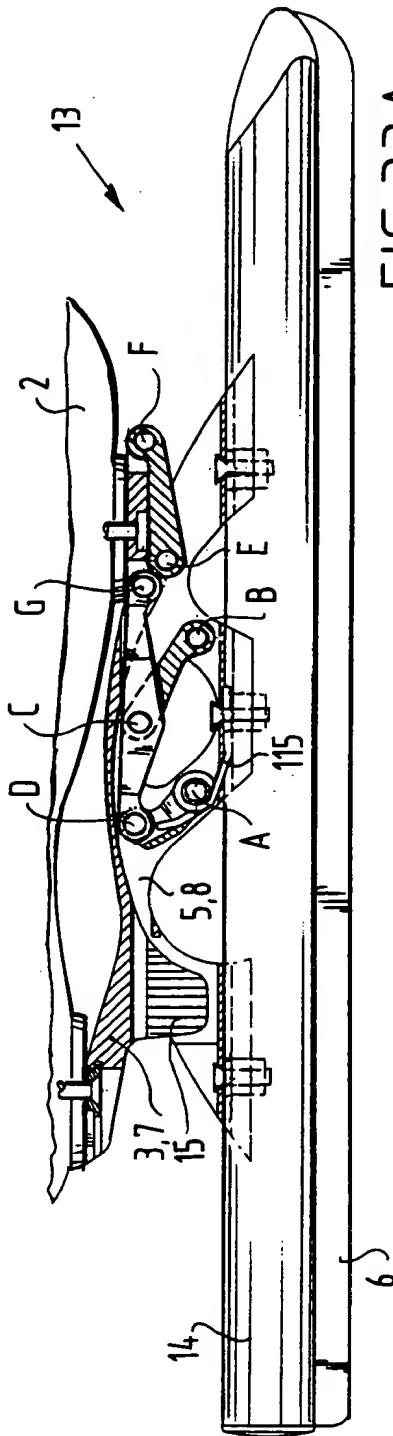


FIG. 33A

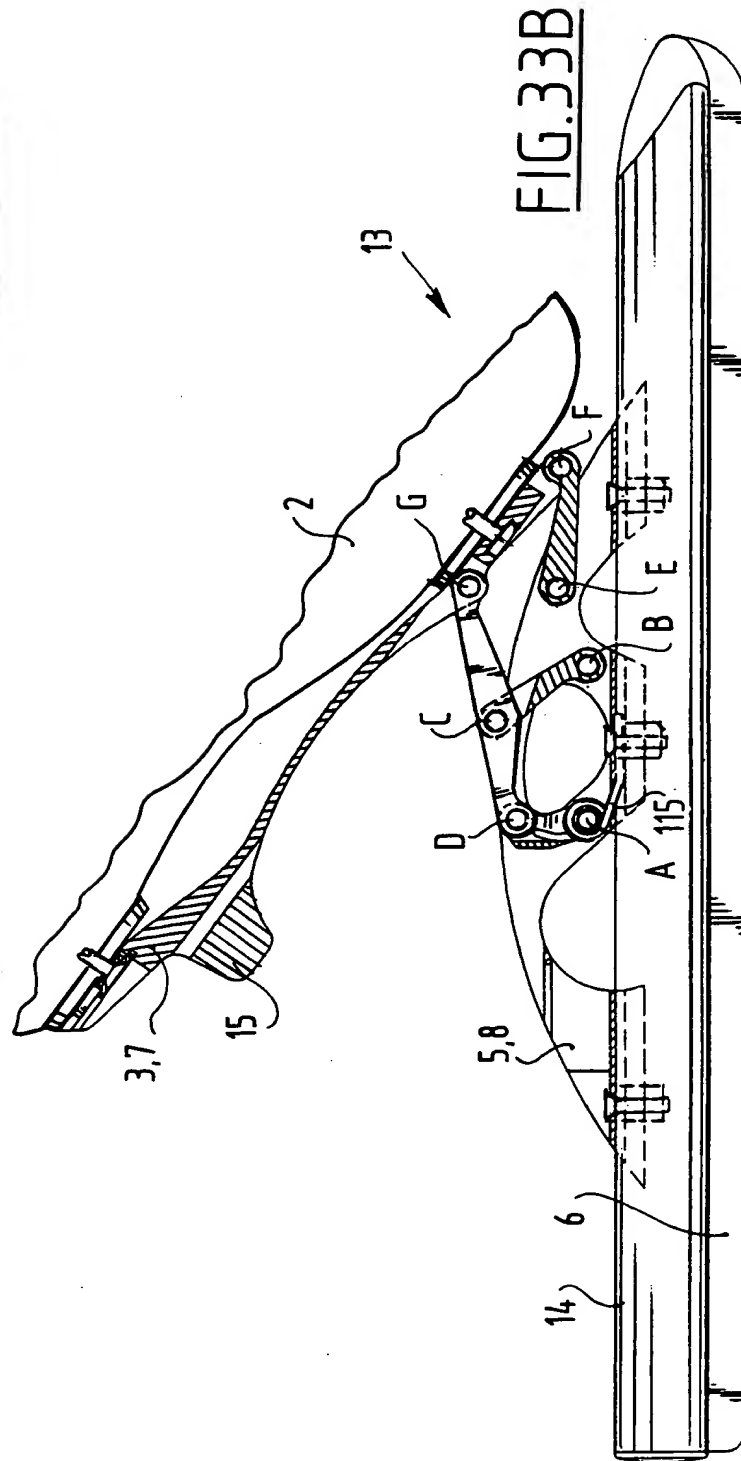


FIG. 33B

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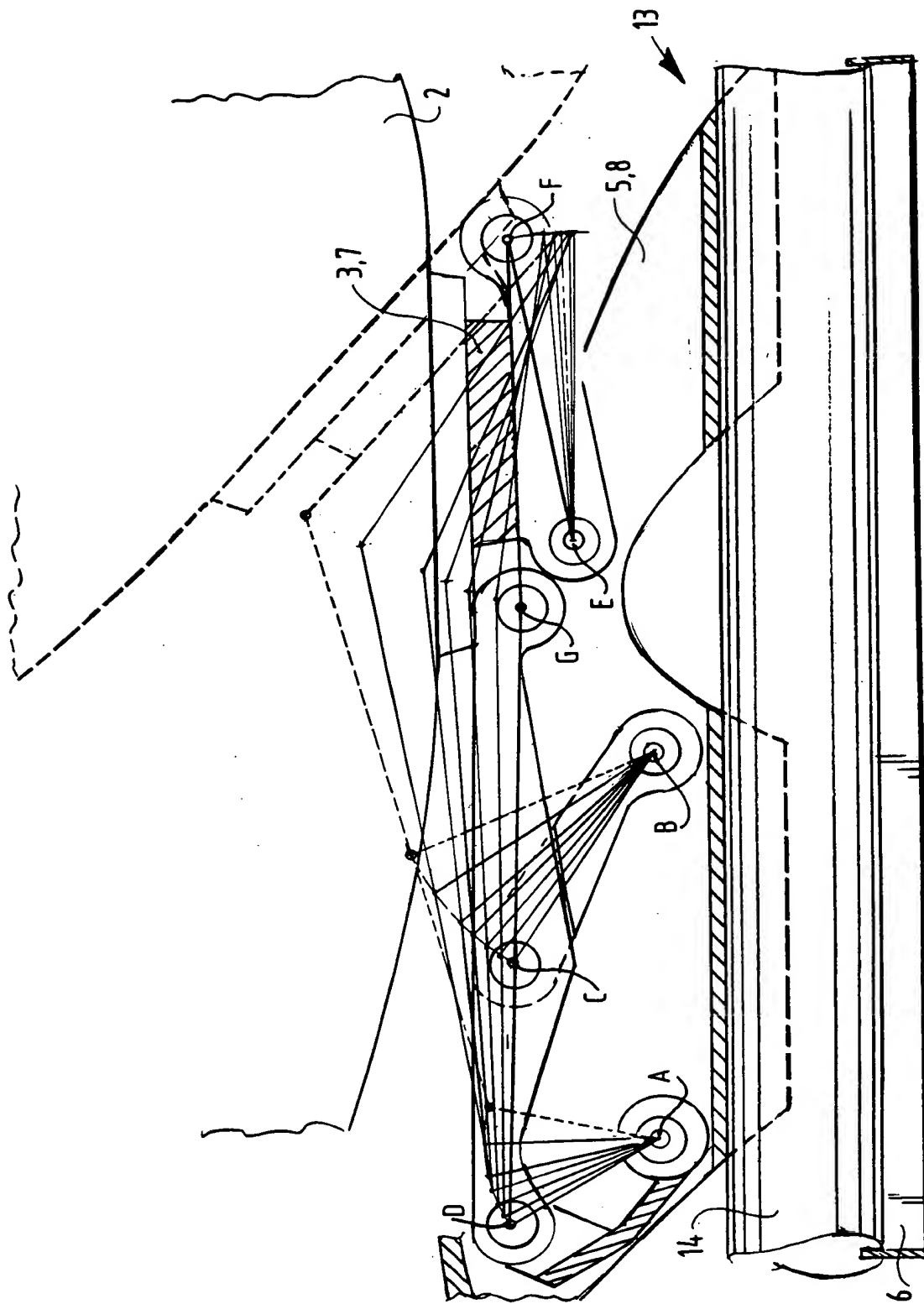
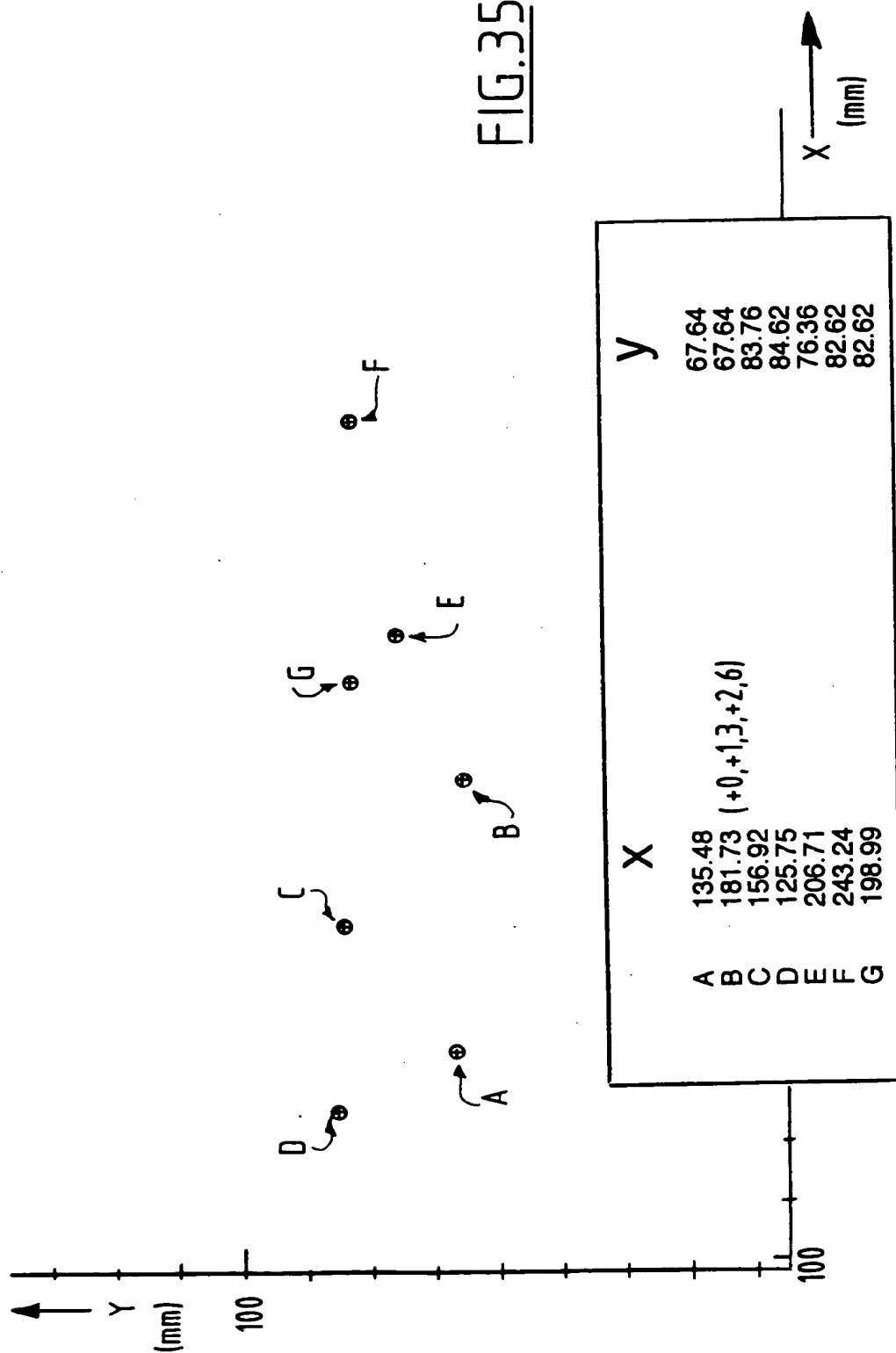


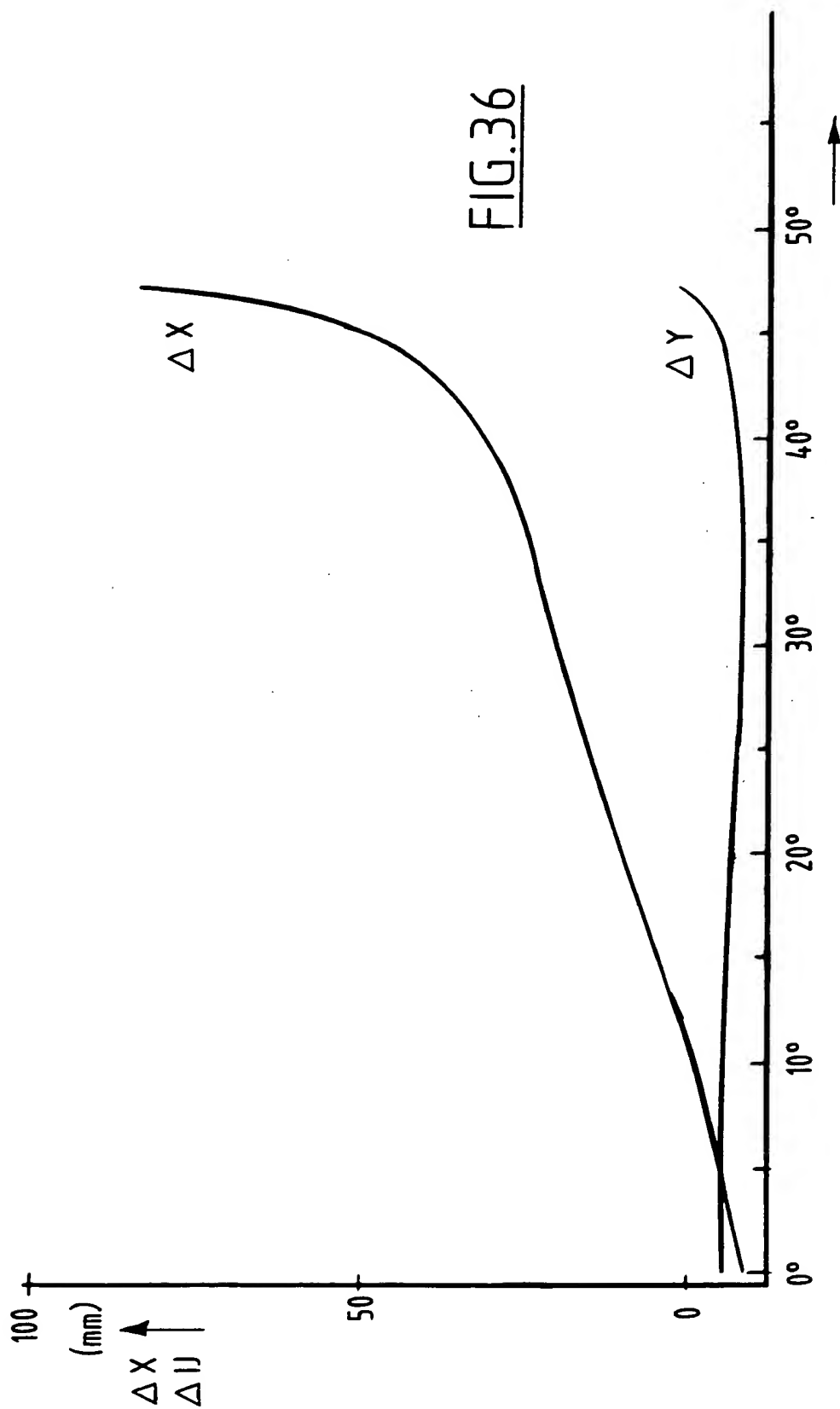
FIG. 34

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FIG.35



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FIG. 36

INTERNATIONAL SEARCH REPORT

International Application No

PCT/NL 96/00209

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 A63C1/28

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 A63C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	NL,A,8 702 068 (VAN OOIJEN) 3 April 1989 see page 3, paragraph 2 - paragraph 3; figure 5	1,3
A	EP,A,0 192 312 (VAN INGEN SCHENAU ET AL) 27 August 1986 see column 2, paragraph 1; figures 4,6	1,3
A	FR,A,2 659 534 (SALOMON SA) 20 September 1991 see figures 1,3	1
A	US,A,3 749 413 (NICOLSON) 31 July 1973 see figures 3,6,10	1
A	DE,A,811 095 (THOMAE ET AL) 14 June 1951 see figure 3	1

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents :

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

- *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
- *&* document member of the same patent family

Date of the actual completion of the international search

27 September 1996

Date of mailing of the international search report

09. 10. 96

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+ 31-70) 340-2040, Tx. 31 651 epo nl,
Fax (+ 31-70) 340-3016

Authorized officer

Steegman, R

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/NL 96/00209

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
NL-A-8702068	03-04-89	NONE	
EP-A-192312	27-08-86	NL-A- 8500483	16-09-86
		NL-A- 8503403	01-07-87
		JP-A- 61247485	04-11-86
FR-A-2659534	20-09-91	CA-A- 2038315	17-09-91
US-A-3749413	31-07-73	NONE	
DE-A-811095		NONE	

PATENT COOPERATION TREATY

PCT

NOTIFICATION OF THE RECORDING
OF A CHANGE(PCT Rule 92bis.1 and
Administrative Instructions, Section 422)

From the INTERNATIONAL BUREAU

To:

SCHUMANN, Bernard, Herman, Johan
Arnold & Siedsma
Sweelinckplein 1
NL-2517 GK The Hague
PAYS-BAS

Date of mailing (day/month/year)

11 March 1997 (11.03.97)

Applicant's or agent's file reference

X Sch/EN/9R

IMPORTANT NOTIFICATION

International application No.

PCT/NL96/00209

International filing date (day/month/year)

24 May 1996 (24.05.96)

1. The following indications appeared on record concerning:

☒

the applicant

☒

the inventor

☐

the agent

☐

the common representative

Name and Address

State of Nationality

State of Residence

Telephone No.

Facsimile No.

Teleprinter No.

2. The International Bureau hereby notifies the applicant that the following change has been recorded concerning:

☐

the person

☐

the name

☐

the address

☐

the nationality

☐

the residence

Name and Address

HOL, Diederik, Hendrik, Alewijn
Bovenweg 16
NL-6721 HW Bennekom
The Netherlands

State of Nationality

NL

State of Residence

NL

Telephone No.

Facsimile No.

Teleprinter No.

3. Further observations, if necessary:

ADDITIONAL APPLICANT/INVENTOR FOR US ONLY.

4. A copy of this notification has been sent to:

☒

the receiving Office

☐

the designated Offices concerned

☐

the International Searching Authority

☒

the elected Offices concerned

☒

the International Preliminary Examining Authority

☐

other:

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No.: (41-22) 740.14.35

Authorized officer

Peggy Steunenberg

Telephone No.: (41-22) 730.91.11

PCT COOPERATION TREATY

PCT

NOTIFICATION OF THE RECORDING
OF A CHANGE(PCT Rule 92bis.1 and
Administrative Instructions, Section 422)

From the INTERNATIONAL BUREAU

To:

SCHUMANN, Bernard, Herman, Johan
Arnold & Siedsma
Sweelinckplein 1
NL-2517 GK The Hague
PAYS-BAS

Date of mailing (day/month/year) 11 March 1997 (11.03.97)	IMPORTANT NOTIFICATION
Applicant's or agent's file reference X Sch/EN/9R	
International application No. PCT/NL96/00209	International filing date (day/month/year) 24 May 1996 (24.05.96)

1. The following indications appeared on record concerning:	
<input checked="" type="checkbox"/> the applicant	<input checked="" type="checkbox"/> the inventor
<input type="checkbox"/> the agent	<input type="checkbox"/> the common representative
Name and Address	State of Nationality
	State of Residence
	Telephone No.
	Facsimile No.
2. The International Bureau hereby notifies the applicant that the following change has been recorded concerning:	
<input type="checkbox"/> the person	<input type="checkbox"/> the name
<input type="checkbox"/> the address	<input type="checkbox"/> the nationality
<input type="checkbox"/> the residence	
Name and Address OTTEN, Egbert Verlengde Grachtstraat 19 NL-9717 GD Groningen The Netherlands	State of Nationality NL
	State of Residence NL
	Telephone No.
	Facsimile No.
3. Further observations, if necessary: ADDITIONAL APPLICANT/INVENTOR FOR US ONLY.	
4. A copy of this notification has been sent to:	
<input checked="" type="checkbox"/> the receiving Office	<input type="checkbox"/> the designated Offices concerned
<input type="checkbox"/> the International Searching Authority	<input checked="" type="checkbox"/> the elected Offices concerned
<input checked="" type="checkbox"/> the International Preliminary Examining Authority	<input type="checkbox"/> other:

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland	Authorized officer Peggy Steunenbergh
Facsimile No.: (41-22) 740.14.35	Telephone No.: (41-22) 730.91.11

INTERNET COOPERATION TREATY

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

United States Patent and Trademark
Office
(Box PCT)
Crystal Plaza 2
Washington, DC 20231
ETATS-UNIS D'AMERIQUE

in its capacity as elected Office

Date of mailing (day/month/year) 10 January 1997 (10.01.97)	
International application No. PCT/NL96/00209	Applicant's or agent's file reference X Sch/EN/9R
International filing date (day/month/year) 24 May 1996 (24.05.96)	Priority date (day/month/year) 24 May 1995 (24.05.95)
Applicant GIERVELD, Johan	

1. The designated Office is hereby notified of its election made:

☒ in the demand filed with the International Preliminary Examining Authority on:
02 December 1996 (02.12.96)

☐ in a notice effecting later election filed with the International Bureau on:

2. The election ☒ was
☐ was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

<p>The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland</p> <p>Facsimile No.: (41-22) 740.14.35</p>	<p>Authorized officer</p> <p>Jocelyne REY-MILLET</p> <p>Telephone No.: (41-22) 730.91.11</p>
--	--

PATENT COOPERATION TREATY

REC'D 2 1 AUG 1997

WIPO

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PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference X Sch/mv/9R	FOR FURTHER ACTION		See Notification of Transmittal of International Preliminary Examination Report (PCT/IPEA/416)
International application No. PCT/NL96/00209	International filing date (day/month/year) 24/05/1996	Priority date (day/month/year) 24/05/1995	
International Patent Classification (IPC) or national classification and IPC A63C1/28			
Applicant GIERVELD BEHEER B.V. et al.			

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.



2. This REPORT consists of a total of 6 sheets, including this cover sheet.

- ☐ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☒ Certain defects in the international application
- VIII ☒ Certain observations on the international application

Date of submission of the demand 02/12/1996	Date of completion of this report 1 9. 08. 97
Name and mailing address of the IPEA/  European Patent Office D-80298 Munich Tel. (+49-89) 2399-0, Tx: 523656 epmu d Fax: (+49-89) 2399-4465	Authorized officer Poock, M Telephone No. (+49-89) 2399-2461 

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/NL96/00209

I. Basis of the report

1. This report has been drawn on the basis of (*substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments.*):

Description, pages:

1-11 as originally filed

Claims, No.:

1-13 as originally filed

Drawings, sheets:

1/17-17/17 as originally filed

2. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
☐ the claims, Nos.:
☐ the drawings, sheets:

3. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

4. Additional observations, if necessary:

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/NL96/00209

II. Priority

1. ☐ This report has been established as if no priority had been claimed due to the failure to furnish within the prescribed time limit the requested:
 - ☐ copy of the earlier application whose priority has been claimed.
 - ☐ translation of the earlier application whose priority has been claimed.
 2. ☐ This report has been established as if no priority had been claimed due to the fact that the priority claim has been found invalid.
- Thus for the purposes of this report, the international filing date indicated above is considered to be the relevant date.
3. Additional observations, if necessary:

III. Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non-obvious), or to be industrially applicable have not been examined in respect of:

- ☐ the entire international application.
- ☐ claims Nos. .

because:

- ☐ the said international application, or the said claims Nos. relate to the following subject matter which does not require an international preliminary examination (*specify*):
- ☐ the description, claims or drawings (*indicate particular elements below*) or said claims Nos. are so unclear that no meaningful opinion could be formed (*specify*):
- ☐ the claims, or said claims Nos. are so inadequately supported by the description that no meaningful opinion could be formed.
- ☐ no international search report has been established for the said claims Nos. .

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/NL96/00209

IV. Lack of unity of invention

1. In response to the invitation to restrict or pay additional fees the applicant has:

- ☐ restricted the claims..
- ☐ paid additional fees.
- ☐ paid additional fees under protest.
- ☐ neither restricted nor paid additional fees.

2. This Authority found that the requirement of unity of invention is not complied and chose, according to Rule 68.1, not to invite the applicant to restrict or pay additional fees.

3. This Authority considers that the requirement of unity of invention in accordance with Rules 13.1, 13.2 and 13.3 is

- ☐ complied with.
- ☐ not complied with for the following reasons:

4. Consequently, the following parts of the international application were the subject of international preliminary examination in establishing this report:

- ☐ all parts.
- ☐ the parts relating to claims Nos. .

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims 1-13
	No: Claims
Inventive step (IS)	Yes: Claims 1-13
	No: Claims
Industrial applicability (IA)	Yes: Claims 1-13
	No: Claims

2. Citations and explanations

cf Separate Sheet, point 1

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/NL96/00209

VI. Certain documents cited

1. Certain published documents (Rule 70.10)

2. Non-written disclosures (Rule 70.9)

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

cf. Separate Sheet, points 2, 4

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

cf. Separate Sheet, point 3

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/NL96/00209

1. The closest state of the art is disclosed in EP-A-0 192 312.

The objective problem to be solved by the subject matter of Claim 1 may therefore be regarded as to provide an improved frame for a sporting device for coupling to a shoe.

The solution to such problem is achieved according to the characterising portion of Claim 1 in that the sub-frames are pivotable **and** translatable in the main plane. According to EP-A-0 192 312 and all other documents in the proceedings, the sub-frames are only pivotable so that it required an inventive effort to find the subject-matter of Claim 1.

Claims 2-13 are dependent from Claim 1 and define preferred embodiments. They meet the requirements of Article 33(1) PCT.

2. The features of the claims are not provided with reference signs placed in parentheses (Rule 6.2(b) PCT).
3. The application does not meet the requirements of Rule 6.2b PCT because "optionally theoretical" and "real or virtual" used in the claims in brackets are no reference signs.

According to Rule 6.2a PCT claims can rely on the drawings **only where absolutely necessary**. In the case of claim 9 it is not necessary (cf. PCT Preliminary Examination Guidelines III, 4.10).

4. Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the document EP-A-0 192 312 is not mentioned in the description, nor is this document identified therein.

A document reflecting the prior art described on page 1, is not identified in the description (Rule 5.1(a)(ii) PCT).

PCT

REQUEST

The undersigned requests that the present international application be processed according to the Patent Cooperation Treaty.

RECORD COPY

For Receiving Office use only	
PCT/NL 96 / 00209	
International Application No.	
24 MAY 1996	(24.05.96)
International Filing Date	
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Box No. I TITLE OF INVENTION	
Sport device	
Box No. II APPLICANT	
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This person is applicant for the purposes of: <input type="checkbox"/> all designated States <input checked="" type="checkbox"/> all designated States except the United States of America <input type="checkbox"/> the United States of America only <input type="checkbox"/> the States indicated in the Supplemental Box	
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In addition to the designations made above, the applicant also makes under Rule 4.9(b) all designations which would be permitted under the PCT except the designation(s) of _____

The applicant declares that those additional designations are subject to confirmation and that any designation which is not confirmed before the expiration of 15 months from the priority date is to be regarded as withdrawn by the applicant at the expiration of that time limit. (Confirmation of a designation consists of the filing of a notice specifying that designation and the payment of the designation and confirmation fees. Confirmation must reach the receiving Office within the 15-month time limit.)

Box No. VI PRIORITY CLAIM Further priority claims indicated in the Supplemental Box ☐

The priority of the following earlier application(s) is hereby claimed:

Country (in which, or for which, the application was filed)	Filing Date (day/month/year)	Application No.	Office of filing (only for regional or international application)
item (1) NL The Netherlands	(24.05.1995) May 24, 1995	NL-1000430	NL-BTE
item (2) NL The Netherlands	(26.09.1995) September 26, 1995	NL-1001284	NL-BTE
item (3) NL The Netherlands	(11.01.1996) January 11, 1996	NL-1002060	NL-BTE

Mark the following check-box if the certified copy of the earlier application is to be issued by the Office which for the purposes of the present international application is the receiving Office (a fee may be required):

☒ The receiving Office is hereby requested to prepare and transmit to the International Bureau a certified copy of the earlier application(s) identified above as item(s): 1, 2, 3

Box No. VII INTERNATIONAL SEARCHING AUTHORITY

Choice of International Searching Authority (ISA) (If two or more International Searching Authorities are competent to carry out the international search, indicate the Authority chosen; the two-letter code may be used): ISA / EP

Earlier search Fill in where a search (international, international-type or other) by the International Searching Authority has already been carried out or requested and the Authority is now requested to base the international search, to the extent possible, on the results of that earlier search. Identify such search or request either by reference to the relevant application (or the translation thereof) or by reference to the search request.

Country (or regional Office): Date (day/month/year): Number:

Box No. VIII CHECK LIST

This international application contains the following number of sheets:

1. request : 3 sheets
 2. description : 12 sheets
 3. claims : 3 sheets
 4. abstract : 1 sheet
 5. drawings : 17 sheets

Total : 36 sheets

This international application is accompanied by the item(s) marked below:

1. ☐ separate signed power of attorney
 2. ☐ copy of general power of attorney
 3. ☐ statement explaining lack of signature
 4. ☒ priority document(s) identified in Box No. VI as item(s):
 5. ☒ fee calculation sheet
 6. ☐ separate indications concerning deposited microorganisms
 7. ☐ nucleotide and/or amino acid sequence listing (diskette)
 8. ☐ other (specify):

Figure No. 32 A of the drawings (if any) should accompany the abstract when it is published.

Box No. IX SIGNATURE OF APPLICANT OR AGENT

Next to each signature, indicate the name of the person signing and the capacity in which the person signs (if such capacity is not obvious from reading the request).



Schumann, Bernard Herman Johan

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1. Date of actual receipt of the purported international application: 24 MAY 1996 (24.05.96)	2. Drawings: <input checked="" type="checkbox"/> received: <input type="checkbox"/> not received:
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4. Date of timely receipt of the required corrections under PCT Article 11(2):	
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17 JUNE 1996

(17.06.96)

X Sch/EN/9R

Sportinrichting

De uitvinding heeft betrekking op een gestel voor een met een schoen te koppelen sportinrichting, zoals een glijdbare of door middel van wielen rolbare ski, in het bijzonder een langlaufski, of een
5 schaatsgestel voor een ijsschaats of rolschaats, welk gestel omvat:

een bovenste subgestel met middelen voor koppeling met een door een gebruiker te dragen schoen;

een via een zwenkmechanisme in een hoofdvlak
10 zwenkbaar met dat bovenste subgestel verbonden onderste subgestel, dat is voorzien van of ingericht om te worden voorzien van een glij-ijzer of wielen; en

terugstel-veermiddelen voor het naar elkaar toe dringen van beide subgestellen.

15 Een dergelijk gestel is voor een schaats bekend en reeds vele jaren in de handel onder de aanduiding "klapschaats".

Het doel van een dergelijke variabele constructie is, de door de rijder op het ijs of de bodem
20 uit te oefenen kracht zo groot mogelijk te maken om daarmee de effectiviteit van de spierkracht en de aldus te behalen snelheid te maximaliseren.

Gebleken is, dat de bekende schaats weliswaar het voordeel heeft van een zeer eenvoudige constructie,
25 maar niet in staat is, de genoemde doelstelling te realiseren.

Een belangrijke oorzaak van dit technische gebrek van de bekende schaats is gelegen in het feit, dat de beide subgestellen scharnierbaar met elkaar verbonden
30 zijn in een zone die in het gebied van de punt van de schoen gelegen is. Weliswaar kan daardoor een grote zwenkhoek worden gerealiseerd, maar de uit te oefenen kracht heeft een effectief aangrijpingspunt dat zover van

de voorzijde van de voet is gelegen, dat een effectieve krachtoverbrenging een illusie is.

De uitvinding stelt zich ten doel, een schaatsgestel zodanig uit te voeren, dat de effectiviteit van de krachtoverbrenging zo groot mogelijk wordt gemaakt, enerzijds door het effectieve aangrijpingspunt van de afzetkrachten bij het schaatsen op grond van fysiologische en ergonomische overwegingen, eventueel variabel, te kiezen en tevens de gebruiker tijdens het rijden ook zijn kuitspieren te laten gebruiken, hetgeen met bekende, niet-variabele schaatsen niet het geval is en met de beschreven bekende klapschaats in slechts zeer geringe, bijna verwaarloosbare mate het geval is.

Van groot belang is, dat het gestel de mogelijkheid biedt tot het afwikkelen van de voet, op een wijze, die verwant is met een loopbeweging. Dit is zowel van belang voor een stabiele afzet als voor het zo goed mogelijk effectief gebruiken van de in aanmerking komende spieren. De schaatsen volgens de stand der techniek zijn hiertoe niet in staat.

In verband met het bovenstaande vertoont het gestel volgens de uitvinding de bijzonderheid dat de subgestellen in het genoemde hoofdvlak onderling zwenkbaar en transleerbaar zijn.

Een specifieke uitvoering vertoont het kenmerk dat de subgestellen deel uitmaken van een ten minste vier onderling zwenkbare en/of transleerbare (eventueel theoretische) stangen omvattend mechanisme. Begrepen dient te worden, dat het hiervoor gebruikte begrip "stangenmechanisme" in ruime zin geïnterpreteerd dient te worden. Bijvoorbeeld kan een translatie in een bepaalde richting worden opgevat als een rotatie van een oneindig lange stang die zich in dwarsrichting ten opzichte daarvan uitstrekt.

Het bovenste subgestel kan zodanig zijn uitgevoerd, dat de positie van de schoen ten opzichte van dat bovenste subgestel instelbaar is. Daarvoor kunnen langsverstelmiddelen aanwezig zijn.

De voorkeur wordt gegeven aan een gestel, waarin het gestel slechts één vrijheidsgraad bezit.

Een vrijheidsgraad is gedefinieerd als een bewegingsmogelijkheid van een mechanisme of een
5 verbinding, die met slechts één variabele is aan te geven, bijvoorbeeld de zwenkhoek die een element rond een scharnierverbinding kan maken. In dit geval zijn de vrijheidsgraden gedefinieerd met betrekking tot de relatieve bewegingsmogelijkheden van het bovenste
10 subgestel en het onderste subgestel.

Het andere aspect van de uitvinding is hierin gelegen, dat het gestel een (reële of virtuele) poolbaan bezit. Een poolbaan is de verzameling van instantane centra van rotatie of polen van het bovenste subgestel
15 ten opzichte van het onderste subgestel. De aandacht wordt erop gevestigd, dat voor een goed-gedefinieerde poolbaan het gestel slechts één vrijheidsgraad mag bezitten.

De voorkeur verdient een uitvoering, waarin de
20 poolbaan in hoofdzaak recht is.

Deze laatste variant kan met voordeel de bijzonderheid vertonen dat de poolbaan zich in hoofdzaak horizontaal uitstrekt.

Deze laatste variant wordt bij voorkeur,
25 althans voor sportinrichtingen met voetafwikkeling, zodanig uitgevoerd dat de poolbaan zich uitstrekt tussen een beginpositie onder de bal van de voet van een gebruiker, in ruststand van het gestel, tot een eindpositie onder de grote teen van de gebruiker, in de
30 uiterste uitgeklapte stand van het gestel.

De beste resultaten worden bereikt met een uitvoering, waarin bij constante relatieve hoeksnelheid van de subgestellen de snelheid van de pool langs de poolbaan van de beginpositie naar de eindpositie
35 toeneemt. Bij voorkeur is de snelheid aanvankelijk in hoofdzaak constant, terwijl naar het einde van de baan de snelheid toeneemt.

Een specifieke variant vertoont de
 bijzonderheid dat een gestel een lid is van de familie
 volgens onderstaande tabel, waarin het eerste getal het
 aantal eventueel theoretische) stangen aangeeft, p1 het
 5 aantal verbindingen met één vrijheidsgraad aanduidt, p2
 het aantal verbindingen met twee vrijheidsgraden aanduidt
 en # de aanwezigheid van een goed-gedefinieerde poolbaan
 en daarmee de geschiktheid voor een sportinrichting met
 voetafwikkeling aanduidt:

10

	Familie/lid	Figuur	p1	p2	geschikt
	2 / 1	8	0	2	#
15	3 / 1	9	2	1	
	3 / 2	10	1	1	
	3 / 3	11	0	1	
	4 / 1	12	4	0	#
	4 / 2	13	4	0	#
20	4 / 3	14	3	2	#
	4 / 4	15	2	4	#
	4 / 5	16	1	6	#
	4 / 6	17	0	8	#
	5 / 1	18	5	1	#
25	5 / 2	19	4	3	#
	5 / 3	20	3	5	#
	5 / 4	21	2	7	#
	5 / 5	22	1	9	#
	5 / 6	23	0	11	#
30	6 / 1	24	7	0	#
	6 / 2	25	6	2	#
	6 / 3	26	5	4	#
	6 / 4	27	4	6	#
	6 / 5	28	3	8	#
35	6 / 6	29	2	10	#
	6 / 7	30	1	12	#
	6 / 8	31	0	14	#

Een voorkeurskeuze uit de beschikbare
 40 mechanismen levert een gestel op, waarin het gestel
 zeven, acht, negen of tien scharnierhartlijnen omvat.

Waarschijnlijk het beste compromis met
 betrekking tot kinematische eisen, gewicht en eenvoud
 wordt gerealiseerd met een gestel, waarin het gestel
 45 zeven scharnierhartlijnen omvat.

Aan alle vermelde criteria wordt voldaan met
 een uitvoering, waarin het gestel is opgebouwd volgens

figuur 24 en (althans de relatieve) dimensionering volgens figuur 35.

Om het hoofd te kunnen bieden aan de optredende zeer grote krachten dient het gestel mechanisch zeer sterk te zijn. In het bijzonder is het van belang dat het gestel torsiestijf is.

De volgende eisen kunnen verder worden gesteld aan het gestel voor toepassing in een schaats met voetafwikkeling:

10 * de maximale hoogte is circa 30 mm. Deze maximale wordt bepaald door de ruimte tussen de dragerbuis voor het glij-ijzer en de schoen.

 * de maximale lengte is circa 150 mm. In dit verband is de hielsteun maatgevend.

15 * de scharnier-hartlijnen vormende assen mogen niet dichterbij elkaar liggen dan ongeveer 10 mm, daar anders sterkte problemen kunnen ontstaan.

De uitvinding zal nu worden toegelicht aan de hand van bijgaande tekeningen. In de tekeningen tonen:

20 figuur 1 A, B en C schematisch een bekende klapschaats in drie respectieve zwenkstanden;

 de figuren 2A, B en C een mogelijke variant van de bekende klapschaats, waarbij het scharnier naar achteren, of onder de bal van de voet, is verplaatst;

25 De figuren 3, 4 en 5 drie mogelijke verbindingen in het platte vlak met één vrijheidsgraad in schematisch zij aanzicht;

 figuur 6 een verbinding in het platte vlak met twee vrijheidsgraden;

30 figuur 7a schematisch het contact tussen twee profielen;

 figuur 7b een nader uitgewerkte uitvoering van de verbinding volgens figuur 7a;

35 figuren 8-31 schematische weergaven van de familieleden van de tabel volgens conclusie 9;

 figuur 32A, B perspectivische aanzichten in gezwenkte toestand van een voorkeursgestel conform figuur 24 (familielid 6/1);

de figuren 33A, B de schaats volgens figuur 32, gedeeltelijk in zijaanzicht, gedeeltelijk in langsdoorsnede in respectievelijk rusttoestand en de uiterste zwenkstand van 48° ;

5 figuur 34 een schema ter toelichting van de structuur van de schaats volgens de figuren 32 en 33;

 figuur 35 een grafische weergave in cartesische coördinaten van de liggingen van de scharnier-hartlijnen; en

10 figuur 36 de positieverandering in X- en Y-richting van de pool als functie van de zwenkhoek van de schaats volgens de figuren 32-35.

 De figuren 1A, 1B en 1C tonen schematisch een bekende klapschaats 1 in respectievelijk een ruststand, een tussengelegen zwenkstand en een uiterste zwenkstand. De schaats omvat een schoen 2, een met de zool daarvan verbonden bovenste subgestel 3, een via een scharnier 4 aan de voorzijde daarmee verbonden onderste subgestel 5, dat buisvormig is uitgevoerd, en een aan het subgestel 5
20 aangebrachte glij-ijzer 6.

 Figuur 2 toont een mogelijke variant van de schaats 1. Deze schaats 9 is in die zin gemodificeerd, dat de hartlijn van het scharnier 4' meer naar achteren ligt dan die van het scharnier 4 volgens figuur 1. Dit
25 zou een verbetering met betrekking tot de krachtoverbrenging met zich mee kunnen brengen. Het scharnier 4' ligt effectief ongeveer onder de bal van de voet van een gebruiker. Weliswaar is hiermee een geringe verbetering van de effectiviteit van de
30 krachtoverbrenging te realiseren in combinatie met een eenvoudige constructie, maar deze uitvoering heeft het nadeel, dat de zwenkhoek noodzakelijkerwijze beperkt is. Dit wordt in het bijzonder duidelijk met verwijzing naar figuur 2c.

35 In het algemeen wordt opgemerkt, dat, waar mogelijk en toepasselijk, dezelfde onderdelen met dezelfde verwijzingsgetallen zijn aangeduid. Dit geldt

niet alleen voor identieke onderdelen, maar ook en vooral voor functioneel gelijke onderdelen.

5 Figuur 3 toont een verbinding tussen twee elementen 7, 8 (corresponderend met respectievelijk het bovenste subgestel 3 en het onderste subgestel 5). Deze verbinding in het platte vlak bezit slechts één vrijheidsgraad.

10 Figuur 4 toont eveneens een verbinding tussen twee elementen 7, 8 met één vrijheidsgraad. Zoals de figuur toont, zijn deze elementen door een rechtgeleiding met elkaar verbonden, zodat ze uitsluitend een vrijheidsgraad van translatie bezitten.

15 Figuur 5 toont een verbinding tussen de elementen 7 en 8, omvattende een curvegeleiding, die effectief een mengvorm impliceert tussen de scharnierverbinding volgens figuur 3 en de rechtgeleiding volgens figuur 4. Het zal duidelijk zijn dat, ondanks dat er sprake is van slechts één vrijheidsgraad, er sprake is van zowel een translatie als een rotatie.

20 Figuur 6 toont een uitvoering van een koppeling tussen de elementen 7 en 8 met twee vrijheidsgraden. Hier is sprake van een scharnier in een geleidebaan.

25 Figuur 7A toont de koppeling tussen twee profielen met zowel een translatie- als rotatie-vrijheidsgraad.

30 De schaats 10 volgens figuur 7B omvat twee met elkaar samenwerkende tandheugels 11, 12, die deel uitmaken van de elementen respectievelijk 7, 8. Het zal duidelijk zijn, dat door een verplaatsing vanuit de met 2, 3 aangeduide ruststand van schoen en bovenste subgestel naar de met 2', 3' aangeduide zwenkpositie er zowel een rotatie als een translatie optreedt, waarbij het centrum van rotatie een baan volgt overeenkomstig de heugel 12. Hier is dus sprake van een reële poolbaan.

35 Voor een goed definieerde poolbaan mag het gestel slechts één vrijheidsgraad bezitten. Nogmaals wordt erop gewezen, dat de uitvinding zich uitsluitend richt op de vrijheidsgraden van de hiervoor reeds

vermelde elementen 7 en 8, overeenkomstig respectievelijk een bovenste subgestel, dat met een schoen is of kan worden gekoppeld, en een onderste subgestel, waarmee een glij-ijzer, wielen, een ski-lat of dergelijke verbonden is/zijn of kan/kunnen worden.

De figuren 8-31 tonen de familieleden als vermeld in de hiervoor opgenomen tabel.

De aandacht wordt erop gevestigd dat, zoals reeds vermeld, voor de in het kader van de uitvinding voor sportinrichtingen met voetafwikkeling toepasbare inrichtingen de aanwezigheid van een poolbaan vereist is. Daarmee vallen de uitvoeringen volgens de figuren 9, 10 en 11 af.

Van bijzonder belang is de uitvoering volgens figuur 24, het familielid 6/1. Deze uitvoering omvat zes stangen en zeven scharnier-hartlijnen. Het in figuur 24 geschetste principe zal hierna concreet worden besproken aan de hand van de voorkeursuitvoering van de uitvinding, met name met verwijzing naar de figuren 32A, B, 33A, B, 34, 35 en 36.

Met betrekking tot de gegeven tabel en de bijbehorende figuren 8-31 wordt opgemerkt, dat naast bovenstaande families van stangenmechanismen ook families kunnen worden geformuleerd met meer dan zes stangen/elementen per mechanisme.

Voor elke scharnierverbinding in bovenstaande families kan ook een rechtgeleiding gekozen worden.

Voor elk scharnier in een geleidebaan kan ook een contact tussen twee profielen gekozen worden waarbij, met verwijzing naar figuur 7a wordt opgemerkt, dat niet in alle richtingen belasting mogelijk is.

Bij elk scharnier in een geleidebaan kan ook een gekromde geleidebaan gekozen worden, hetgeen een beïnvloeding van de poolbaan van een element met zich meebrengt.

De vierentwintig mechanismen volgens de figuren 8-31 en hun varianten conform bovenstaande aantekeningen zijn niet alle even geschikt om te voldoen aan strenge

eisen, die aan de poolbaan van een element kunnen worden gesteld. De in principe geschikte elementen zijn in tabel met # aangeduid.

- Rechtgeleidingen, curvegeleidingen en
- 5 scharniergeleidingen zijn in de praktijk minder goed in staat het mechanisme in het gedefinieerde vlak te houden dan eenvoudige scharnieren.

- Ervaringen met families van stelsels als hiervoor omschreven heeft aangetoond dat met vier
- 10 scharnieren aan de te stellen strenge eisen voor kinematiek, gewicht, eenvoud en goed-gedefinieerde poolbaan niet is te voldoen. Met zeven scharnieren is aan de eisen met zeer goede benadering te voldoen, terwijl met tien scharnieren aan de eisen vrijwel perfect voldaan
- 15 kan worden.

- Mede met het oog op gering gewicht, eenvoud van de constructie en prijsstelling is het mechanisme volgens figuur 24, familielid 6/1, naar het huidige inzicht het meest geschikt. De hierna volgende figuren hebben daarop
- 20 alle betrekking.

- De figuren 32A en B tonen een schaats 13, die gebaseerd is op het in figuur 24 geschetste principe. Correspondierend met figuur 24 is het bovenste subgestel aangeduid met een dubbele verwijzing 3, 7 om de
- 25 functionele samenhang duidelijk te maken tussen het bovenste subgestel volgens de figuren 1 en 2 en het element 7 volgens figuur 24. Overeenkomstig is het onderste subgestel aangeduid met 5, 8. Begrepen dient in dit verband te worden, dat het onderste subgestel 5, 8
- 30 door schroeven is verbonden met een buisvormig gesteldeel 14, dat het glij-ijzer 6 draagt.

- In de figuren 32A en B, 33A, B en 34 zijn uitsluitend de zeven scharnieren A, B, C, D, E, F en G aangegeven. De zes stangen worden, voorzover nodig,
- 35 aangeduid met de betreffende indicaties van deze scharnieren. Het zal duidelijk zijn, dat de stang A B C wordt gevormd door het onderste subgestel 5, 8, 14,

inclusief het buisvormige gesteldeel 14. Met de zool van de schoen 2 is het bovenste subgestel G F gekoppeld.

In het bijzonder de figuren 33A en B tonen duidelijk de diverse positieveranderingen tijdens

- 5 zwenking van de diverse stangen en hun scharnieren. Figuur 34 toont de in figuur 33A getoonde stand op grote schaal. Hierin zijn tevens de verplaatsingen van de scharnieren D, C, G en F bij zwenking van het subgestel 3, 7 getekend.

- 10 De hiervoor reeds besproken poolbaan van het subgestel 3, 7, of wel de stang G F, loopt conform de te stellen eisen nagenoeg geheel horizontaal van onder de bal van de voet tot onder de grote teen van een gebruiker, mits voldaan is aan het
- 15 dimensioneringsvoorschrift, dat is weergegeven in figuur 35 en de daarbij opgenomen tabel.

- In figuur 35 is in een cartesisch coördinatenstelsel de positie van elk scharnier A, B, C, D, E, F, G aangeduid. De aandacht wordt erop gevestigd,
- 20 dat de X-coördinaat van het scharnier B de aangegeven waarde kan bezitten of een zekere positieve afwijking kan vertonen, afhankelijk van de schoenmaat van de gebruiker. Bijvoorbeeld kan gekozen worden voor drie schoenmaten, waarbij de positieve afwijking ten opzichte van de
- 25 gegeven basiswaarde respectievelijk ongeveer 1,3 en 2,6 mm bedraagt.

- De aandacht wordt erop gevestigd, dat de oorsprong van het coördinatenstelsel volgens figuur 35 willekeurig aan de achterzijde van het onderste subgestel
- 30 5, 8 is gekozen. Elk ander punt van dit subgestel 5, 8 had ook als referentie kunnen dienen, bijvoorbeeld het scharnier A. Ten opzichte van bijvoorbeeld dit scharnier A kunnen de dimensioneringen van het hele stelsel A-G worden gewijzigd, mits de verhoudingen worden
- 35 gehandhaafd.

Figuur 36 toont in parameter-voorstelling de poolbaan van het bovenste subgestel 3, 7 ten opzichte van het onderste subgestel 5, 8. Horizontaal is de zwenkhoek

in graden weergegeven, terwijl in verticale richting de positieverandering van het zwenkingsmiddelpunt in respectievelijk X-richting (Δx) en Y-richting (Δy) aangeduid. Uit de grafiek van figuur 36 blijkt, dat de
5 verandering Δy in verticale richting enkele millimeters bedraagt en aan het einde van de zwenkbaan, overeenkomend met een zwenkhoek van ongeveer 48° , ongeveer op nul uitkomt.

De positieverandering van de pool in
10 horizontale richting is aangeduid met Δx . Tot ongeveer 35° zwenkhoek is de snelheid nagenoeg constant. Na dat traject versnelt de pool tot de eindstand.

Nogmaals wordt de aandacht erop gevestigd, dat de pool zich bij een zwenkhoek nul ongeveer onder de bal
15 van de voet bevindt en aan het einde zich onder de grote teen bevindt.

De aandacht wordt gevestigd op een als helix-torsie-veer uitgevoerde terugstelveer 115 (zie figuur 33A, B), die rond de as van scharnier A is aangebracht en een
20 zodanige terugstelkracht uitoefent tussen de stangen ABE (zie figuur 24) en AD dat het subgestel 3, 7 daardoor naar zijn in figuur 33A getoonde ruststand wordt gedrongen, waar een hakelement 15 kan rusten in een van het onderste subgestel 5, 8 deel uitmakende, toelopende
25 aanslagvorm 16, die met een elastisch materiaal bekleed is om aldus een zachte aanslag te vormen.

Het onderste subgestel 5, 8 kan zijn vervaardigd door uit te gaan van een geëxtrudeerd profiel, waaruit selectief delen zijn weggenomen. Alle
30 stangen van het gestel kunnen zeer geschikt van aluminium zijn vervaardigd. Dit materiaal combineert een gering gewicht met een voldoende sterkte. De scharnieren kunnen op zichzelf bekende wijze van zeer slijtvaste materialen en combinaties daarvan zijn vervaardigd.

35 De aandacht wordt erop gevestigd, dat niet in alle figuren de terugstel-veermiddelen zijn getoond. Deze kunnen zeer geschikt zijn uitgevoerd als een helix-trekveer, een torsie-veer of een spiraalveer. Ook kunnen

meerdere veren in het stangenmechanisme werkzaam zijn. De voorspanning en stijfheid van de veermiddelen worden bepaald door twee overwegingen. Enerzijds dient tijdens de onwerkzame fase van een schaatsslag het onderste subgestel zo snel mogelijk te worden gebracht naar het bovenste subgestel. Anderzijds dient de terugstelkracht niet zodanig groot te zijn, dat een te aanzienlijk deel van de beschikbare kracht door de veermiddelen wordt opgenomen.

10 Opgemerkt wordt, dat de volgens de uitvinding te realiseren relatief grote zwenkhoek van meer, eventueel aanzienlijk meer dan 20°, overeenkomt met een natuurlijke afwikkeling van de beweging van een voet.

15 De schaats volgens de uitvinding maakt een optimaal gebruik van de mogelijke rotatie van de voet rond de enkel. Deze beweeglijkheid wordt aangeduid als "plantar flexion" en is wezenlijk voor een goede krachtoverbrenging.

20 Op basis van bovenstaande, zeer kort weergegeven overwegingen is te verwachten, dat het schaatsgestel volgens de uitvinding essentiële snelheidsverhogingen met zich mee kan brengen.

X Sch/EN/9R

Conclusies

1. Gestel voor een met een schoen te koppelen sportinrichting, zoals een glijdbare of door middel van wielen rolbare ski, in het bijzonder een langlaufski, of een schaatsgestel voor een ijsschaats of rolschaats, welk
5 gestel omvat:
 een bovenste subgestel met middelen voor koppeling met een door een gebruiker te dragen schoen;
 een via een zwenkmechanisme in een hoofdvlak zwenkbaar met dat bovenste subgestel verbonden onderste
10 subgestel, dat is voorzien van of ingericht om te worden voorzien van een glij-ijzer of wielen; en
 terugstel-veermiddelen voor het naar elkaar toe dringen van beide subgestellen;
 met het kenmerk, dat
15 de subgestellen in het genoemde hoofdvlak onderling zwenkbaar en transleerbaar zijn.
2. Gestel volgens conclusie 1, waarin de subgestellen deel uitmaken van een ten minste vier onderling zwenkbare en/of transleerbare (eventueel
20 theoretische) stangen omvattend mechanisme.
3. Gestel volgens conclusie 1, waarin het gestel slechts één vrijheidsgraad bezit.
4. Gestel volgens conclusie 3, waarin het gestel een (reële of virtuele) poolbaan bezit.
25 5. Gestel volgens conclusie 3, waarin de poolbaan in hoofdzaak recht is.
6. Gestel volgens conclusie 3, waarin de poolbaan zich in hoofdzaak horizontaal uitstrekt.
7. Gestel volgens conclusie 4, waarin de
30 poolbaan zich uitstrekt tussen een beginpositie onder de bal van de voet van een gebruiker, in ruststand van het gestel, tot een eindpositie onder de grote teen van de

gebruiker, in de uiterste uitgeklapte stand van het gestel.

8. Gestel volgens conclusie 3, waarin bij constante relatieve hoeksnelheid van de subsgestellen de
5 snelheid van de pool langs de poolbaan van de beginpositie naar de eindpositie toeneemt.

9. Gestel volgens conclusie 4, waarin een gestel een lid is van de familie volgens onderstaande tabel, waarin het eerste getal het aantal (eventueel
10 theoretische) stangen aangeeft, p1 het aantal verbindingen met één vrijheidsgraad aanduidt, p2 het aantal verbindingen met twee vrijheidsgraden aanduidt en # de aanwezigheid van een goed-gedefinieerde poolbaan en daarmee de geschiktheid voor een sportinrichting met
15 voetafwikkeling aanduidt:

	Familie/lid	Figuur	p1	p2	geschikt
20	2 / 1	8	0	2	#
	3 / 1	9	2	1	
	3 / 2	10	1	1	
	3 / 3	11	0	1	
	4 / 1	12	4	0	#
25	4 / 2	13	4	0	#
	4 / 3	14	3	2	#
	4 / 4	15	2	4	#
	4 / 5	16	1	6	#
	4 / 6	17	0	8	#
30	5 / 1	18	5	1	#
	5 / 2	19	4	3	#
	5 / 3	20	3	5	#
	5 / 4	21	2	7	#
	5 / 5	22	1	9	#
35	5 / 6	23	0	11	#
	6 / 1	24	7	0	#
	6 / 2	25	6	2	#
	6 / 3	26	5	4	#
	6 / 4	27	4	6	#
40	6 / 5	28	3	8	#
	6 / 6	29	2	10	#
	6 / 7	30	1	12	#
	6 / 8	31	0	14	#

45 10. Gestel volgens conclusie 9, waarin het gestel zeven, acht, negen of tien scharnierhartlijnen omvat.

11. Gestel volgens conclusie 10, waarin het gestel zeven scharnierhartlijnen omvat.

12. Gestel volgens conclusie 11, waarin het gestel is opgebouwd volgens figuur 24 en (althans de
5 relatieve) dimensionering volgens figuur 35.

13. Gestel volgens conclusie 1, waarin het gestel torsiestijf is.

X Sch/EN/9R

Uittreksel

De uitvinding heeft betrekking op een gestel voor een met een schoen te koppelen sportinrichting, zoals een glijdbare of door middel van wielen rolbare ski, in het bijzonder een langlaufski, of een

5 schaatsgestel voor een ijsschaats of rolschaats, welk gestel omvat:

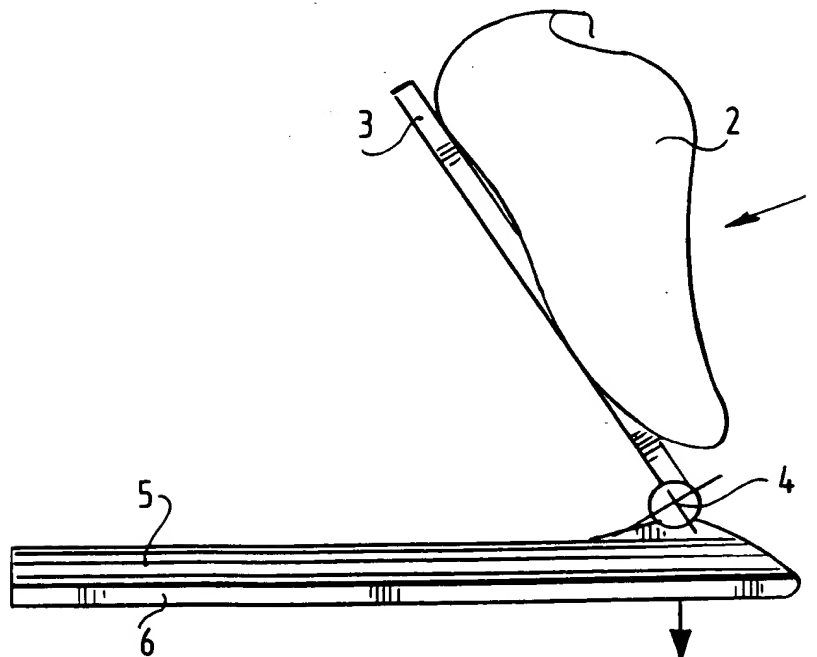
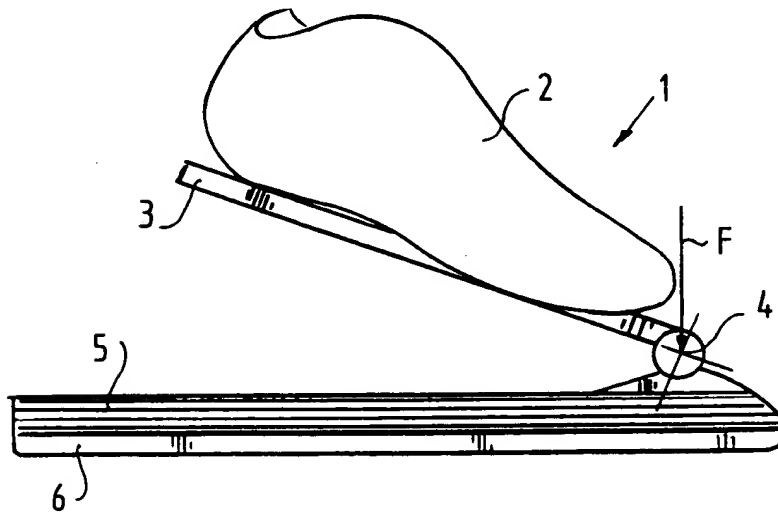
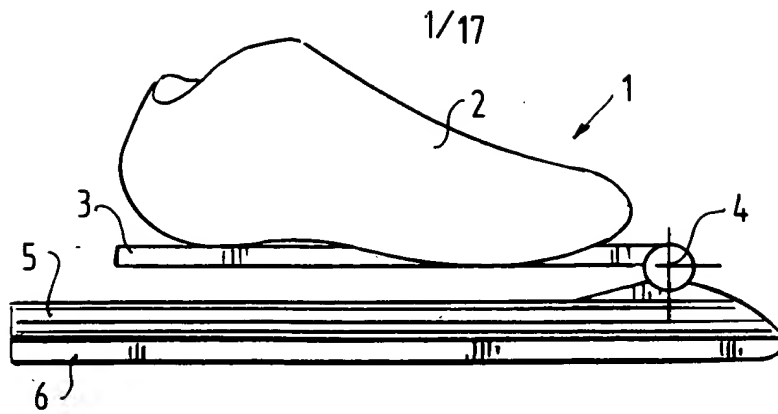
een bovenste subgestel met middelen voor koppeling met een door een gebruiker te dragen schoen;

10 een via een zwenkmechanisme in een hoofdvlak zwenkbaar met dat bovenste subgestel verbonden onderste subgestel, dat is voorzien van of ingericht om te worden voorzien van een glij-ijzer of wielen; en

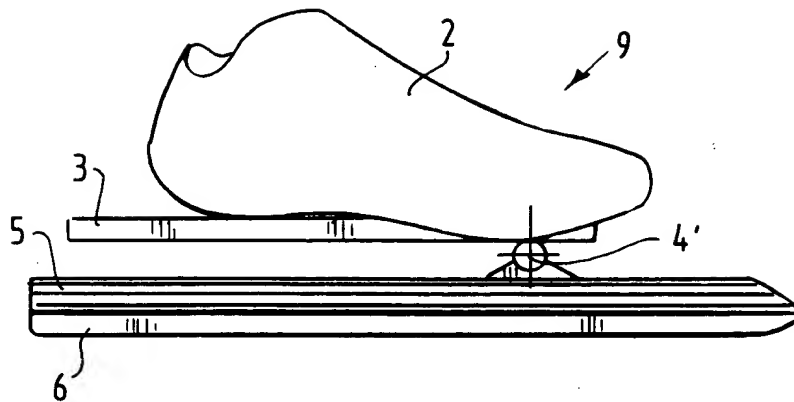
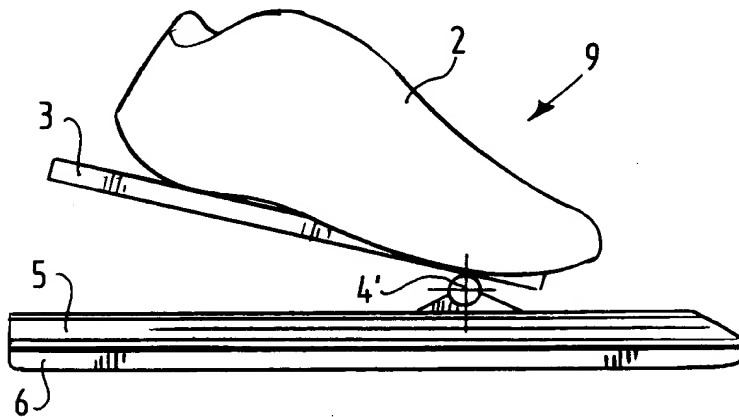
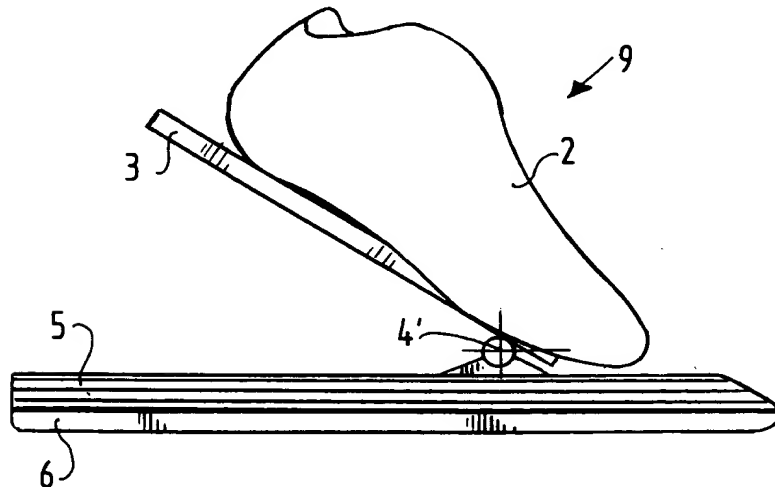
terugstel-veermiddelen voor het naar elkaar toe dringen van beide subgestellen.

15 Het gestel volgens de uitvinding vertoont de bijzonderheid dat de subgestellen in het genoemde hoofdvlak onderling zwenkbaar en transleerbaar zijn.

Een specifieke uitvoering vertoont het kenmerk dat de subgestellen deel uitmaken van een ten minste vier
20 onderling zwenkbare en/of transleerbare (eventueel theoretische) stangen omvattend mechanisme.



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FIG. 2AFIG. 2BFIG. 2C

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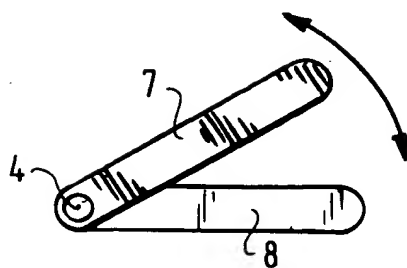


FIG. 3

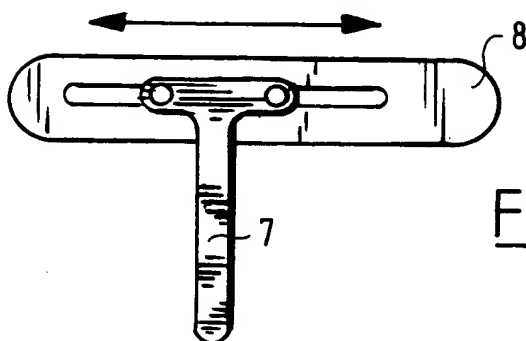


FIG. 4

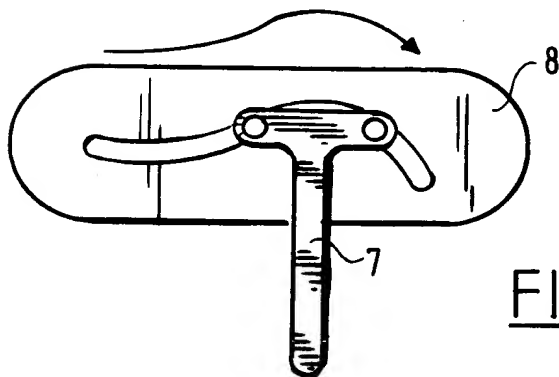


FIG. 5

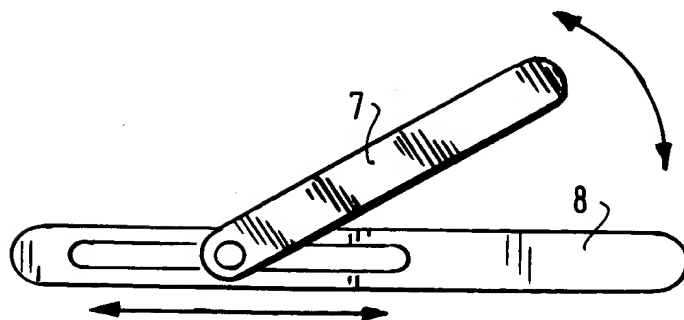
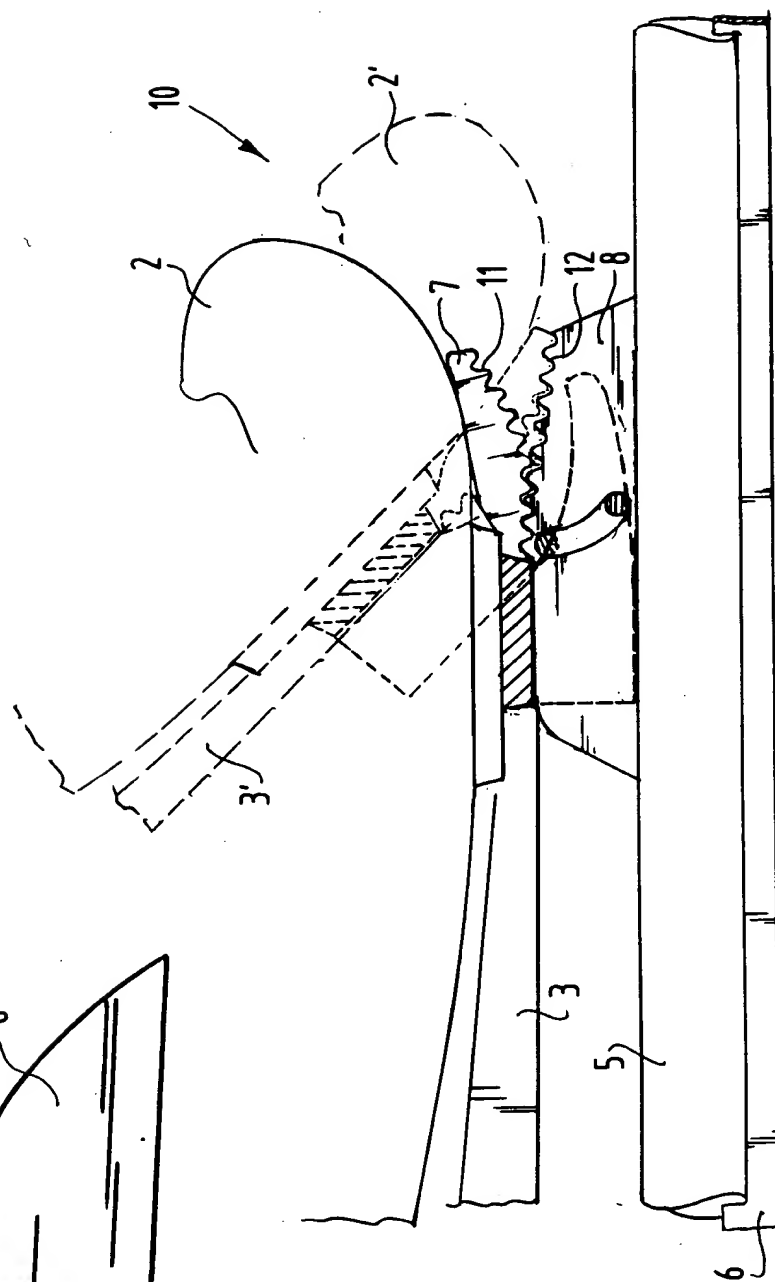
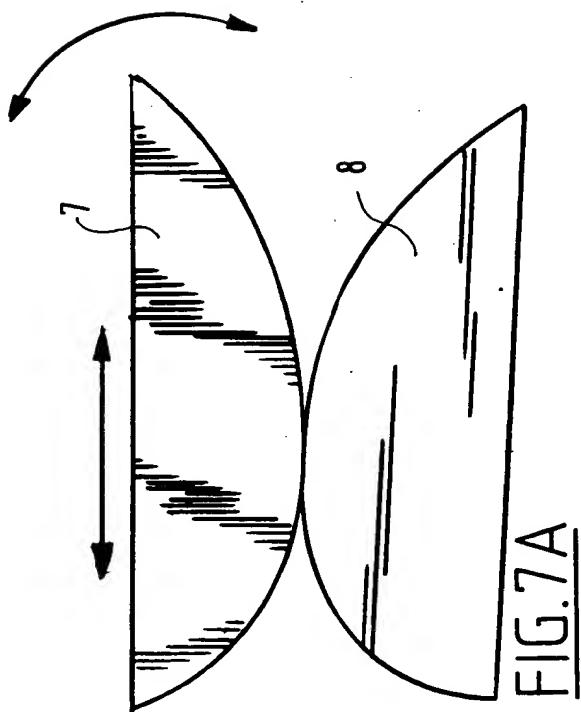


FIG. 6

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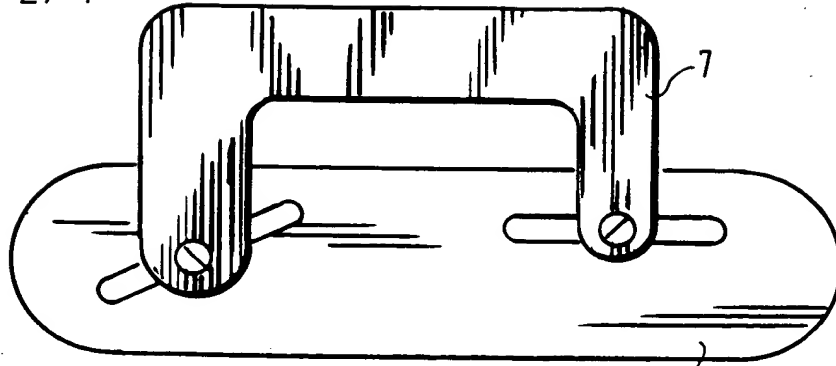


FIG. 8

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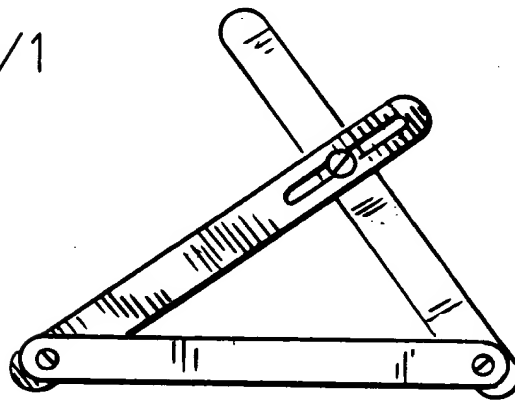


FIG. 9

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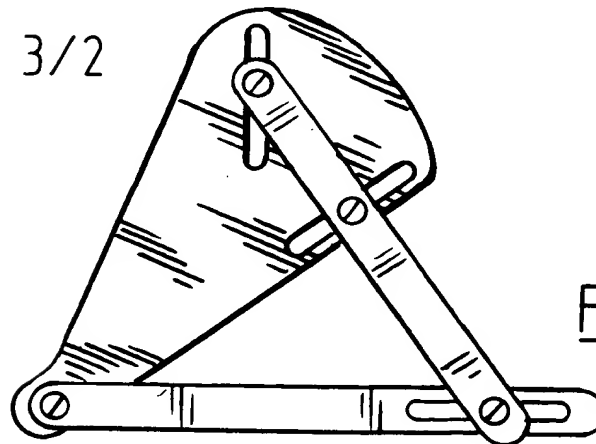


FIG. 10

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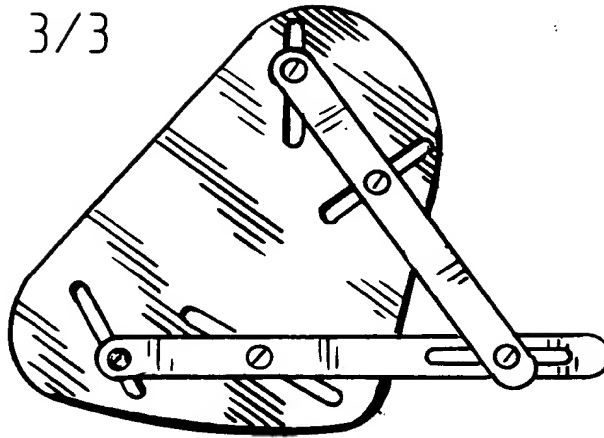


FIG. 11

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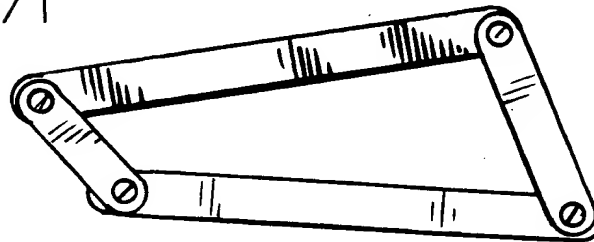


FIG. 12

4/2

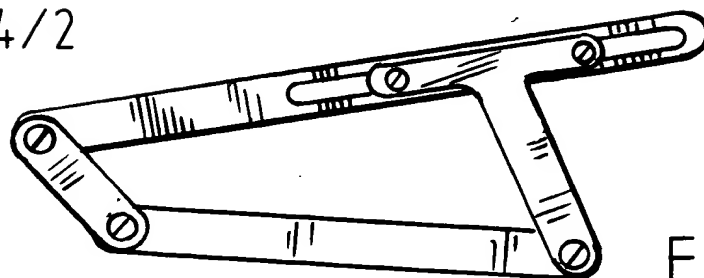


FIG. 13

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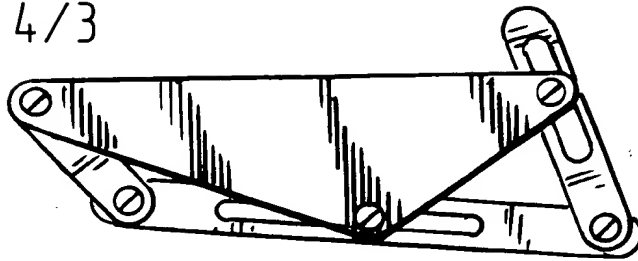


FIG. 14

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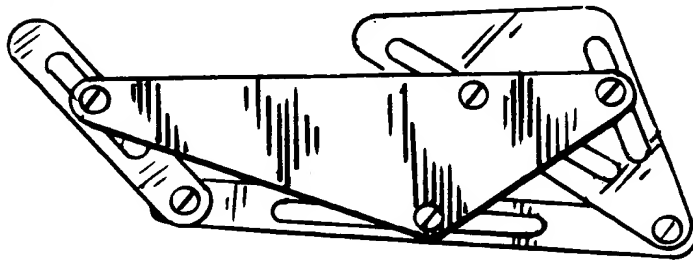


FIG. 15

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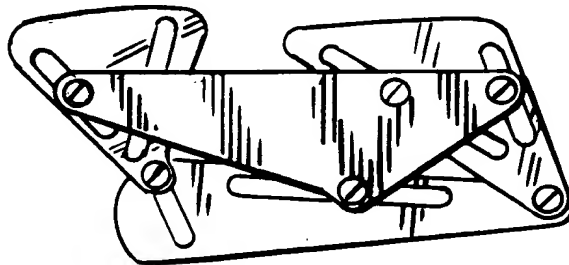


FIG. 16

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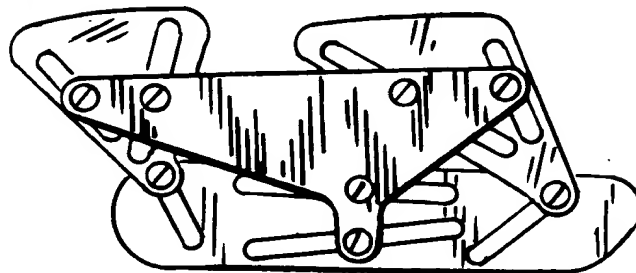
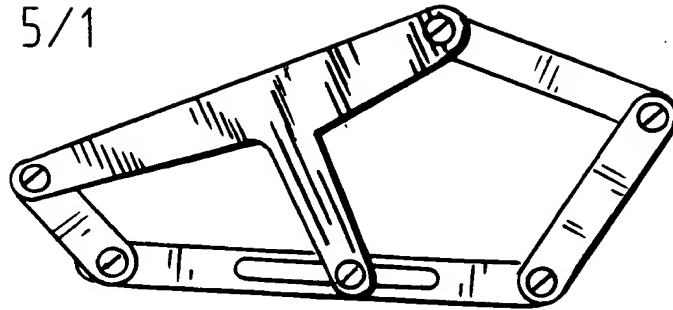


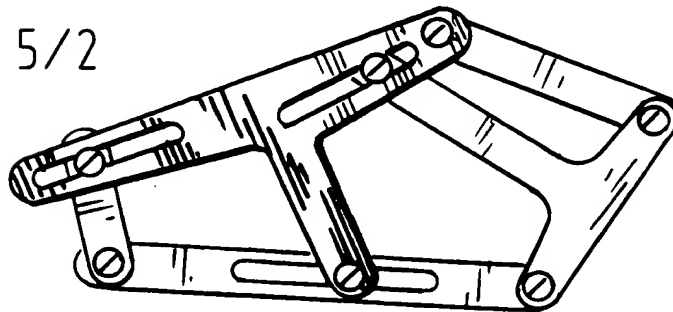
FIG. 17

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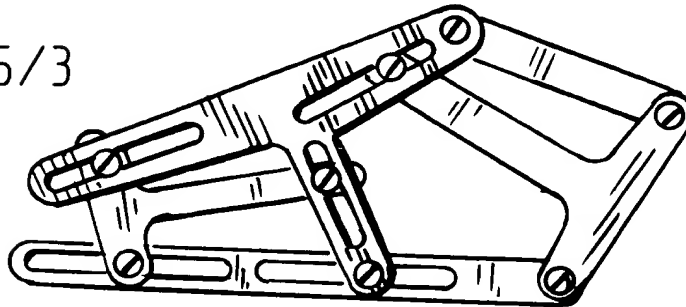
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FIG. 18

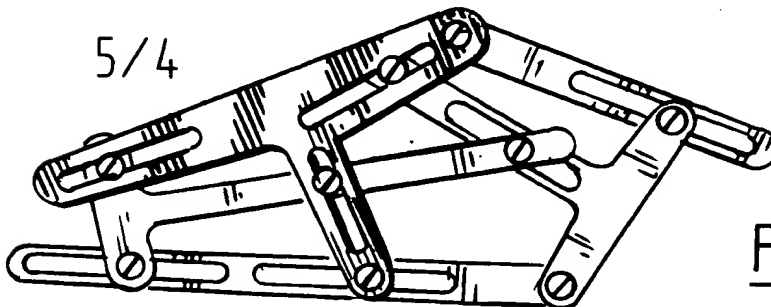
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FIG. 19

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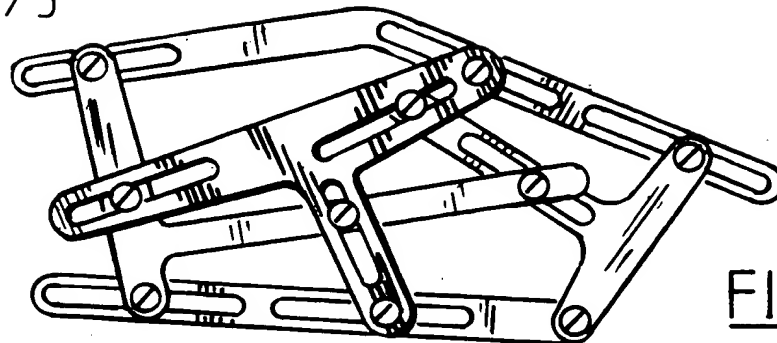
FIG. 20

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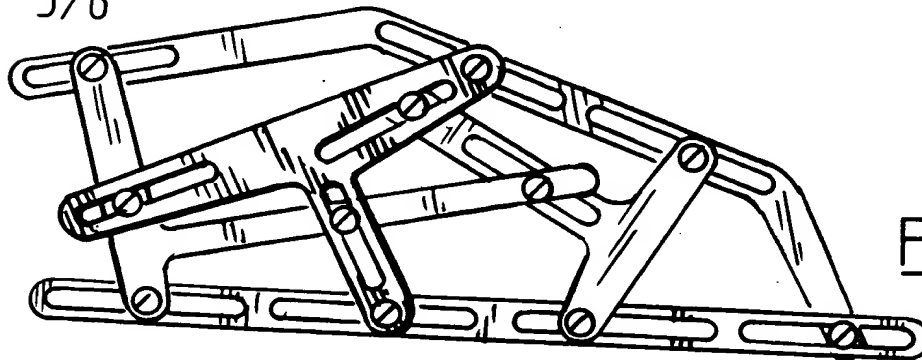
FIG. 21

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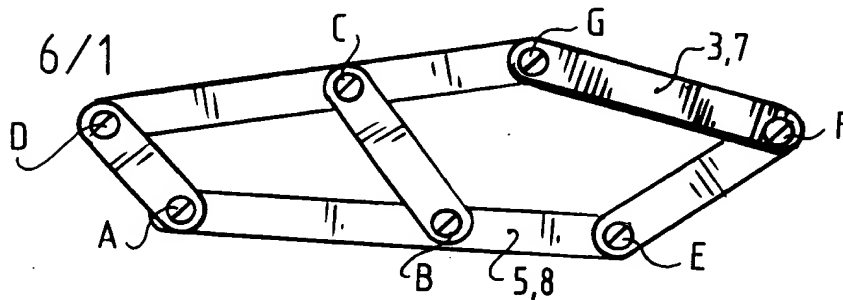
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FIG. 22

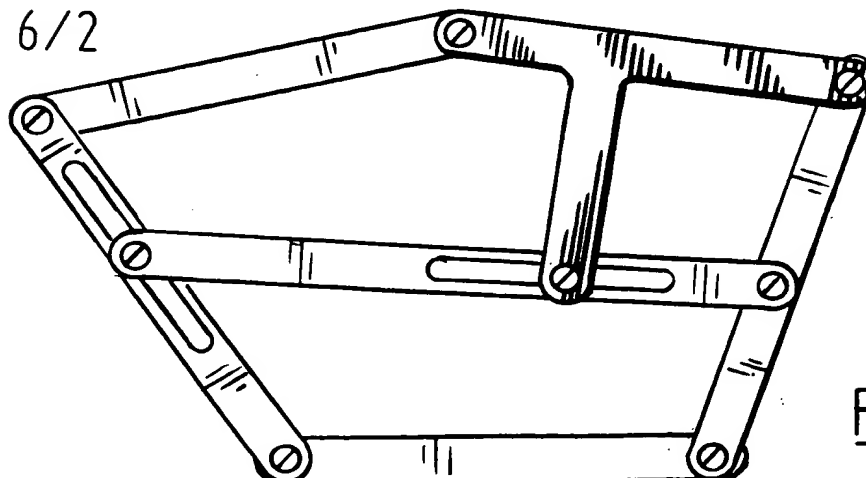
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FIG. 23

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FIG. 24

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FIG. 25

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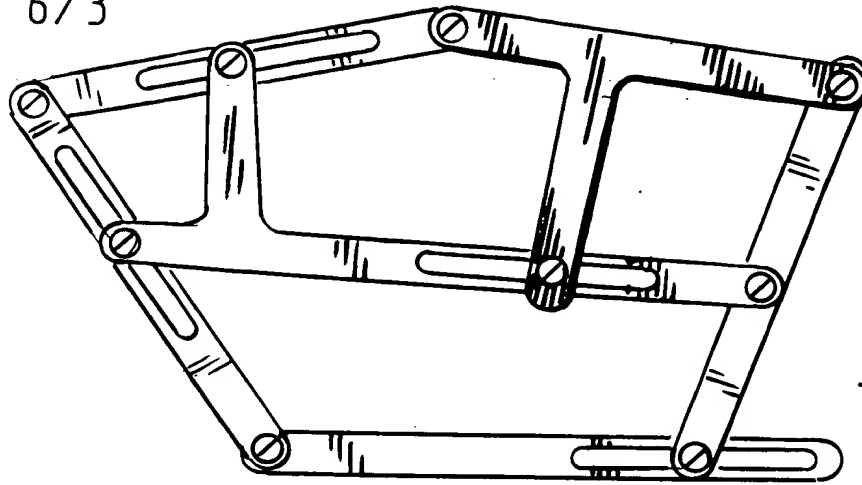


FIG. 26

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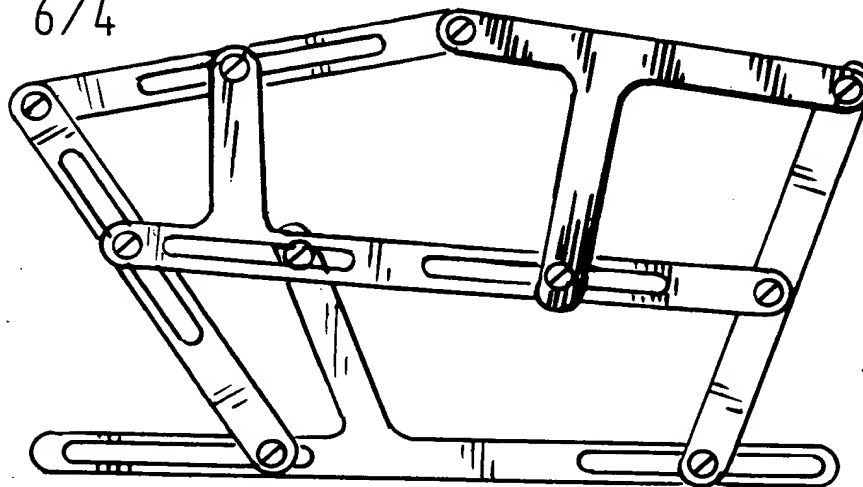


FIG. 27

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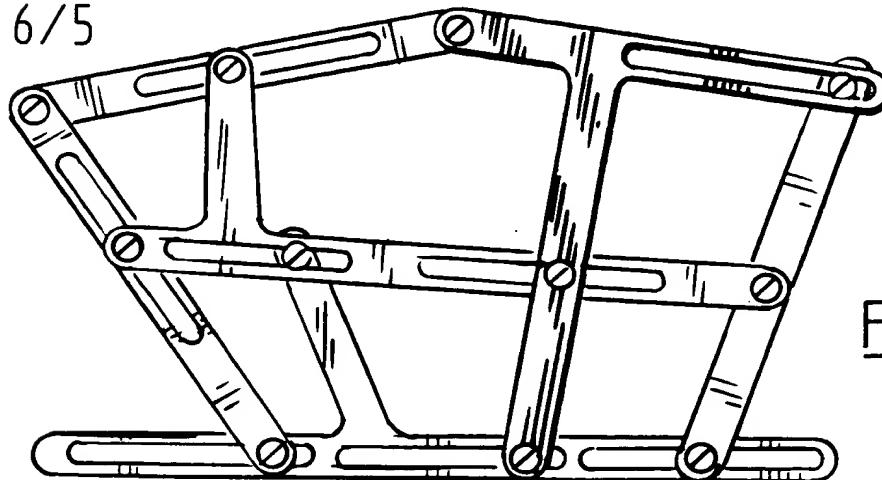


FIG. 28

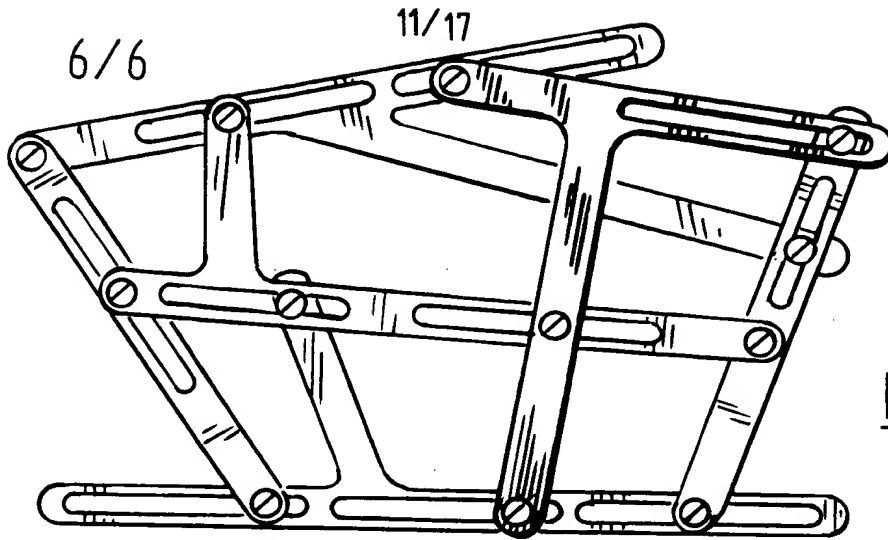


FIG.29

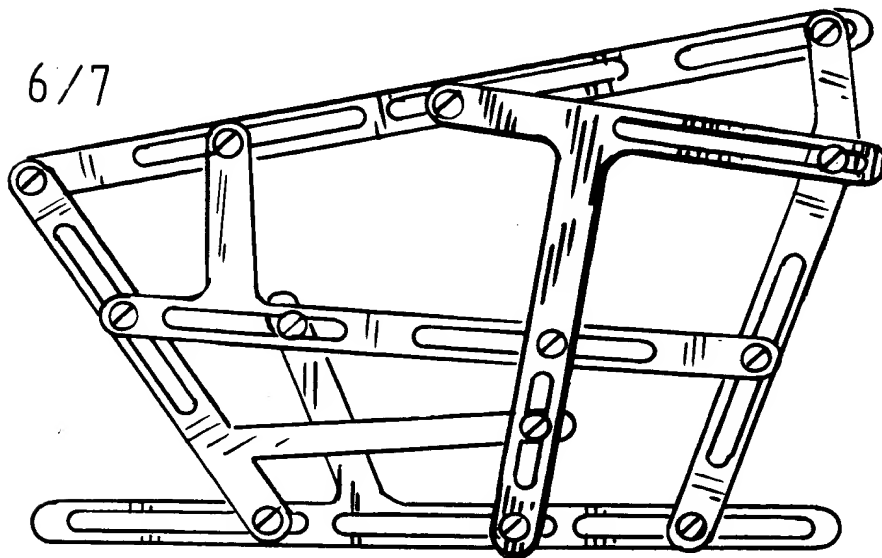


FIG.30

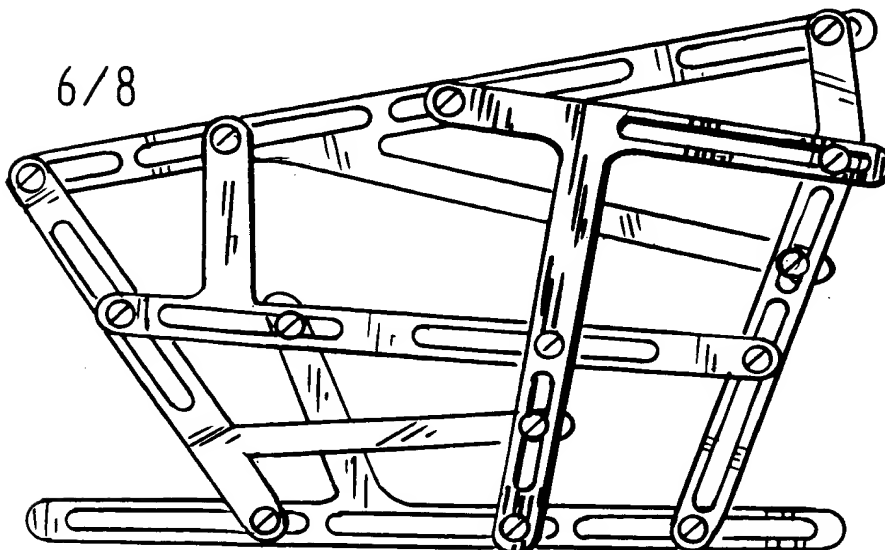


FIG.31

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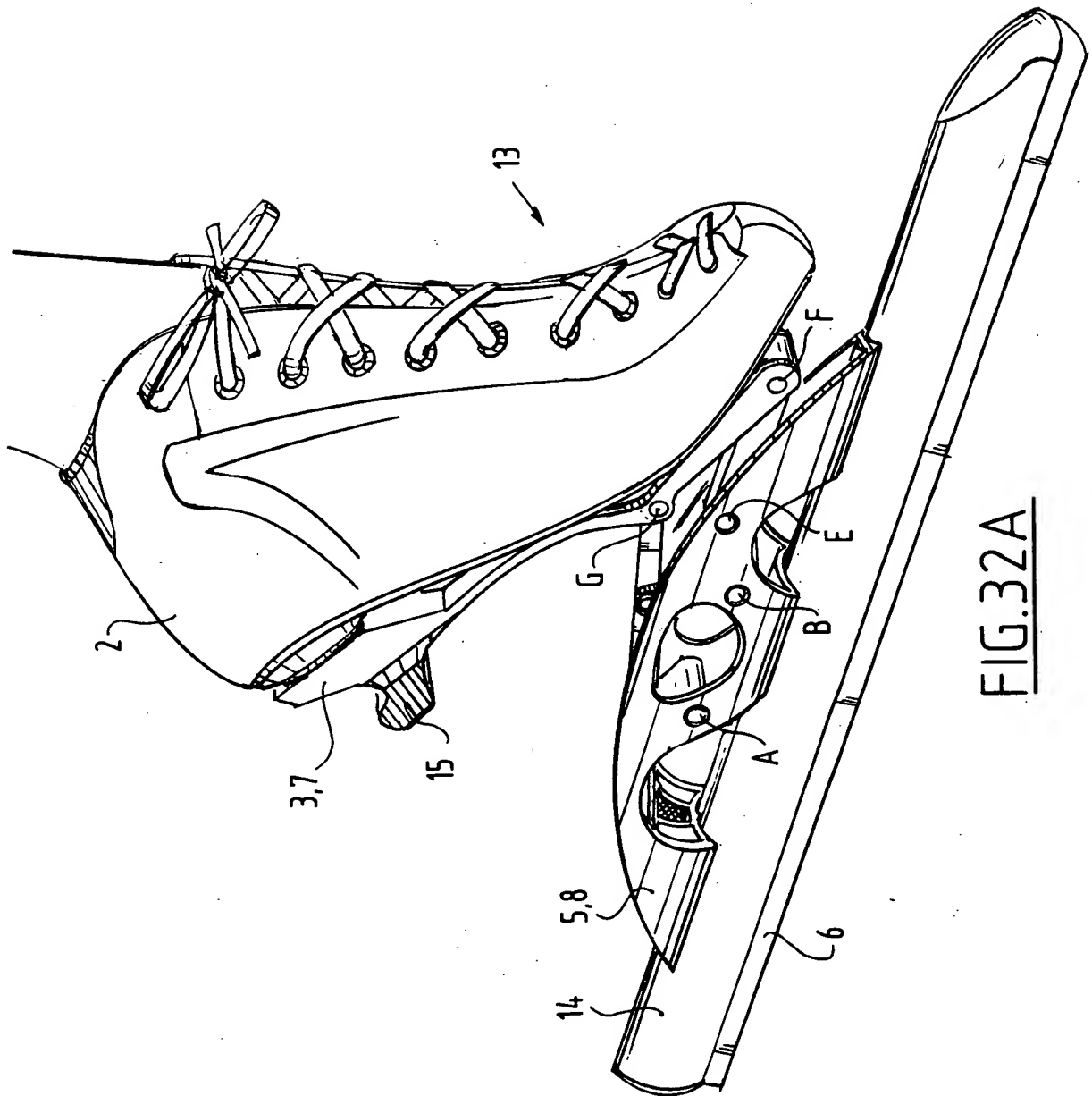


FIG. 32A

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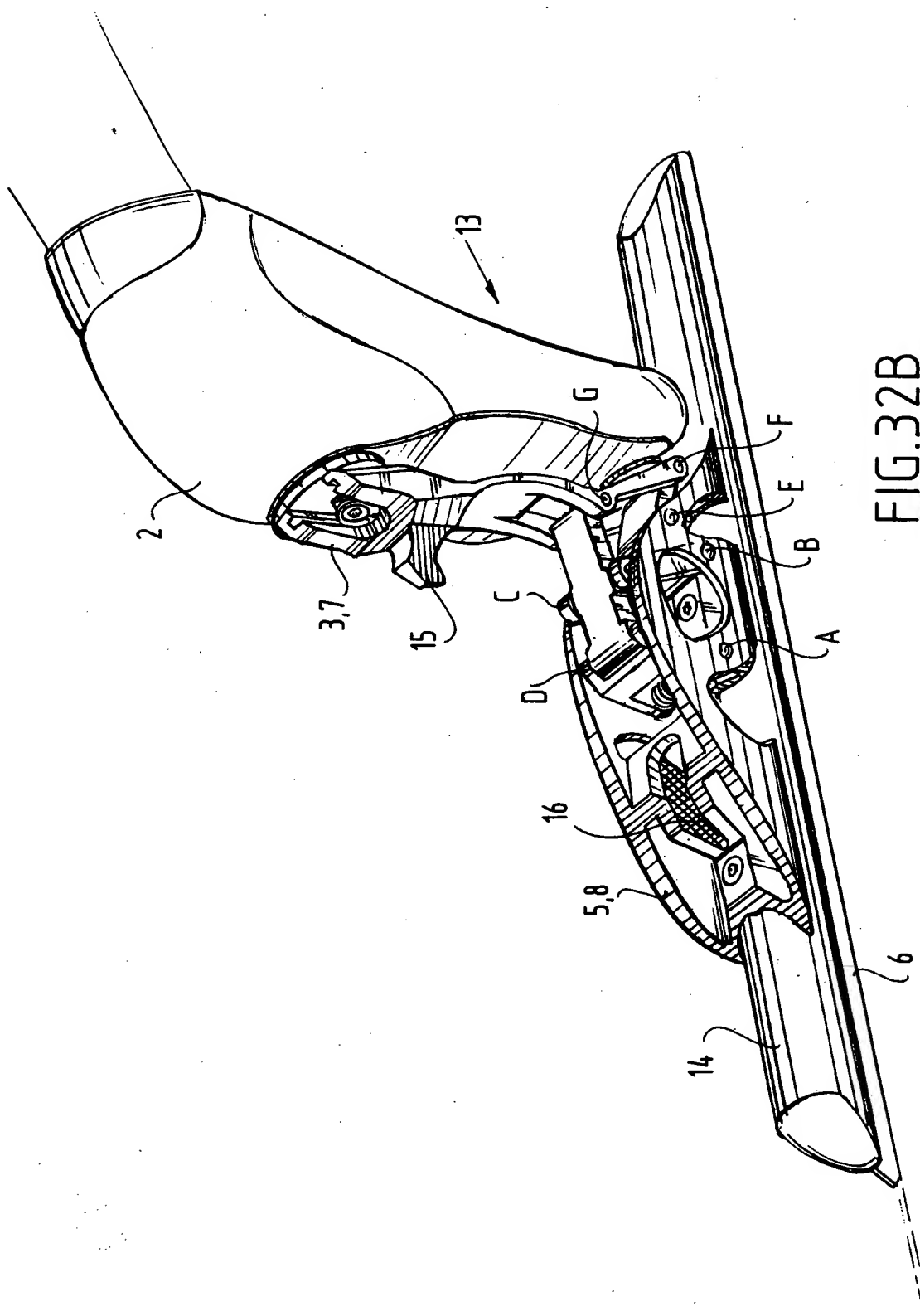
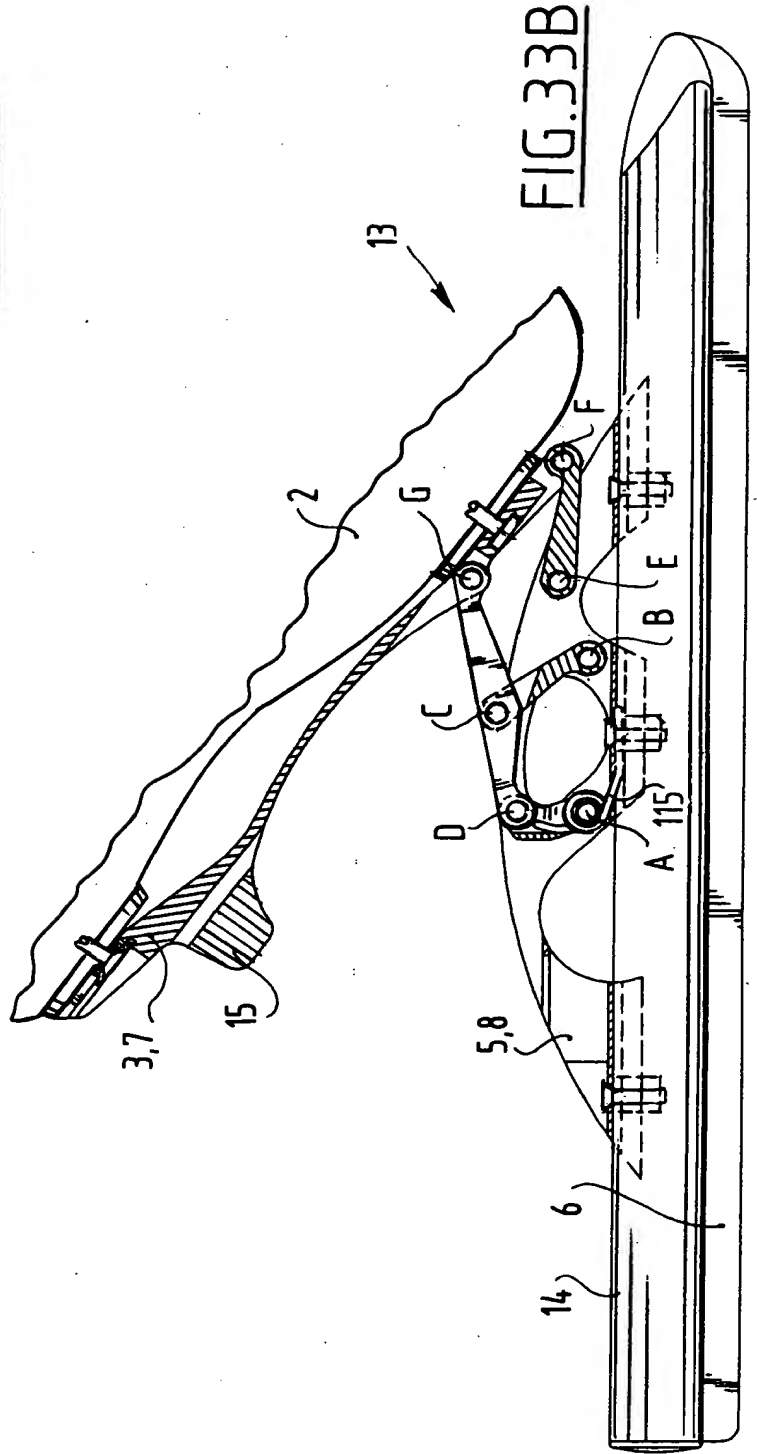
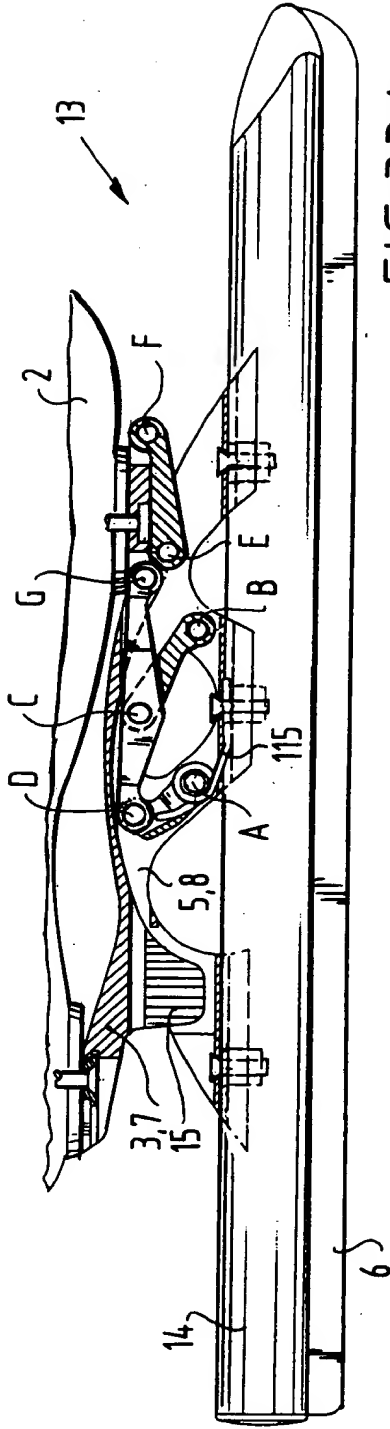


FIG. 32B

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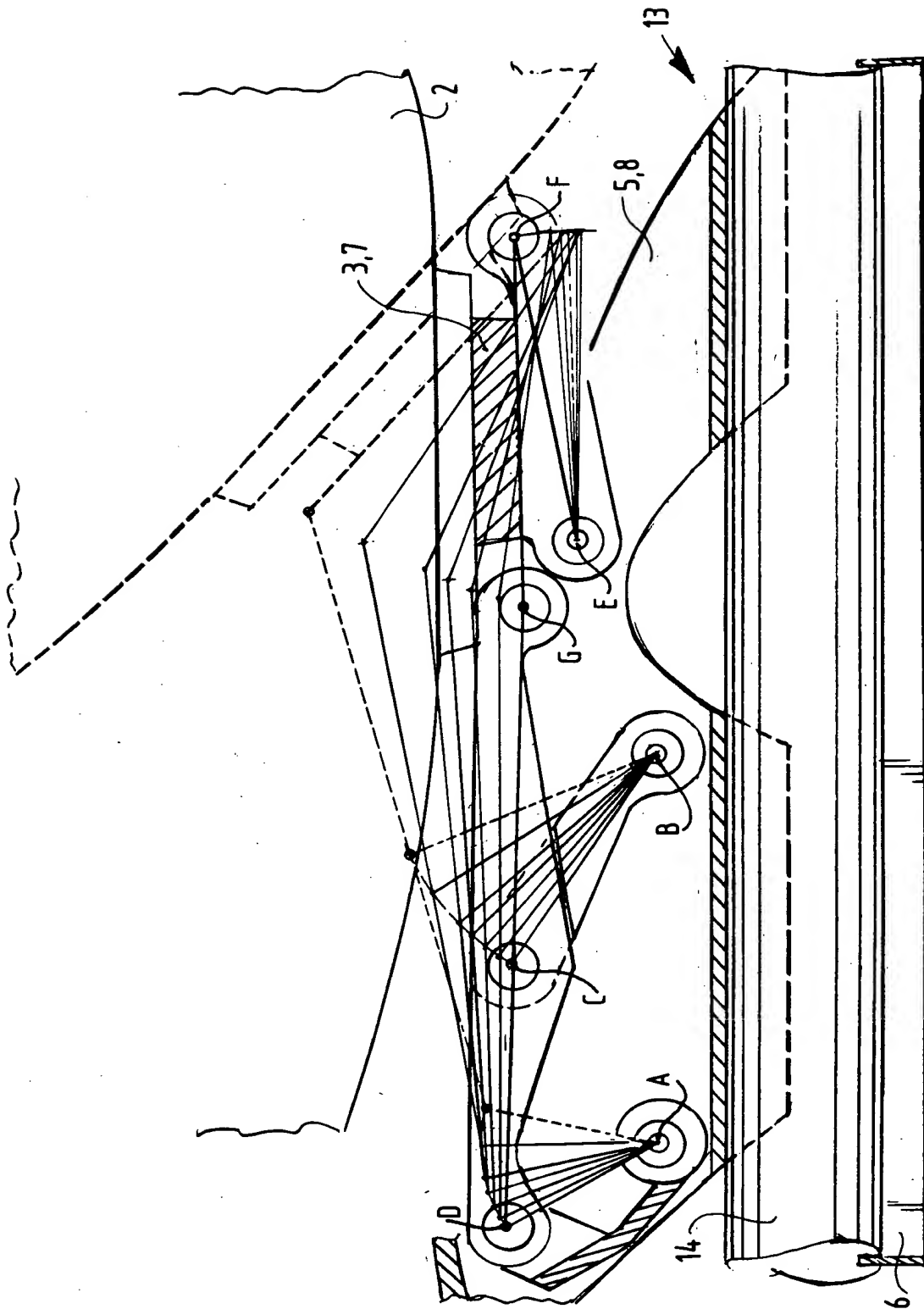
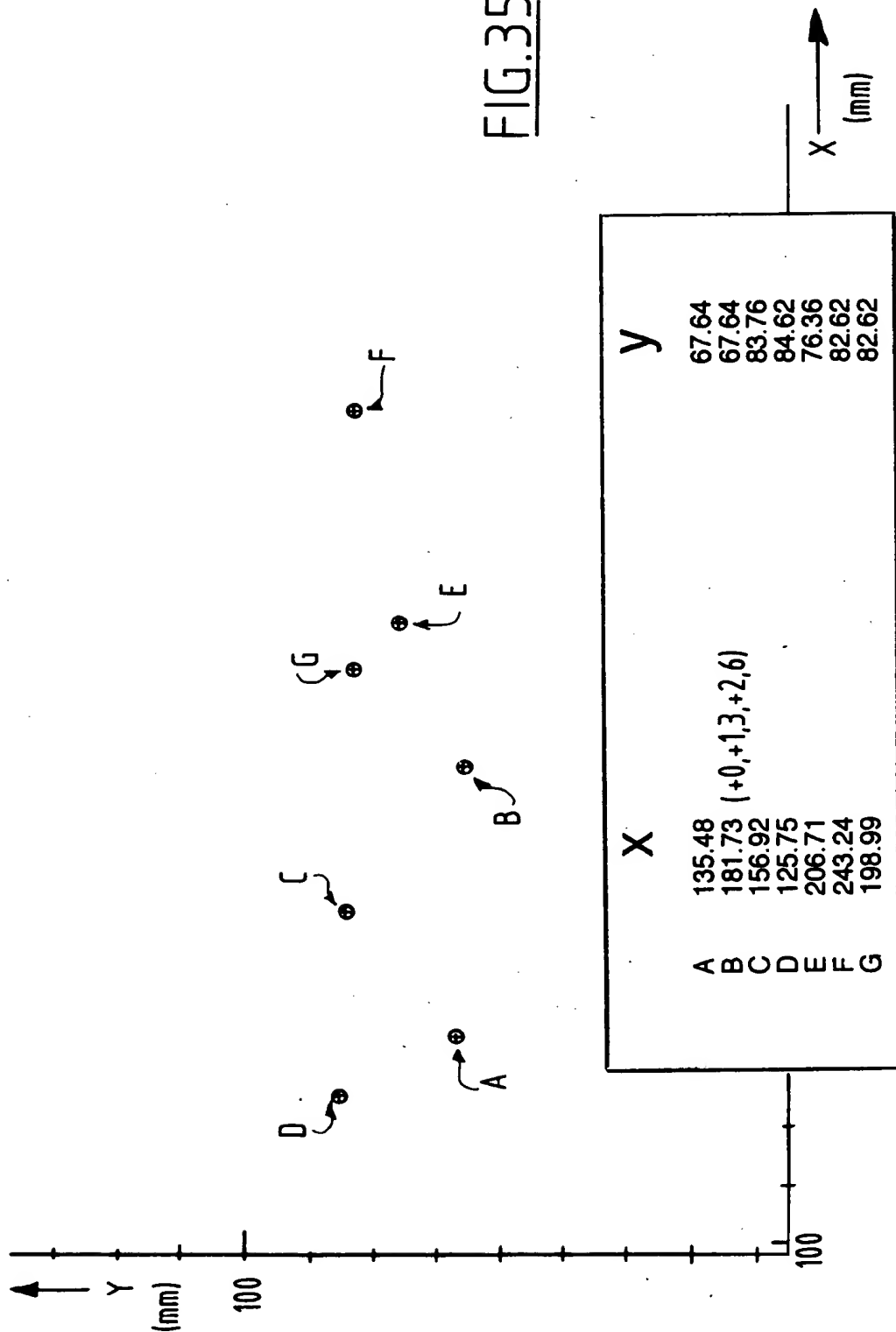


FIG.35



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CA, CH, CN, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IS,
JP, KE, KG, KP, KR, KZ, LK, LR, LS, LT, LU, LV, MD,
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(57) Abstract

The invention relates to a frame for a sporting device for coupling to a shoe, such as a ski which is slidable or rollable by means of wheels, in particular a cross-country ski, or a skate frame for an ice-skate or roller-skate, which frame comprises: an upper sub-frame with means for coupling to a shoe to be worn by a user; a lower sub-frame which is coupled via a pivot mechanism to said upper sub-frame for pivoting in a main plane and which is provided with or adapted to be provided with a runner or wheels; and resetting spring means for urging both sub-frames toward each other. The frame according to the invention has the special feature that the sub-frames are mutually pivotable and translatable in the said main plane. A specific embodiment has the feature that the sub-frames form part of a mechanism comprising at least four mutually pivotable and/or translatable (optionally theoretical) rods.

